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February 1996

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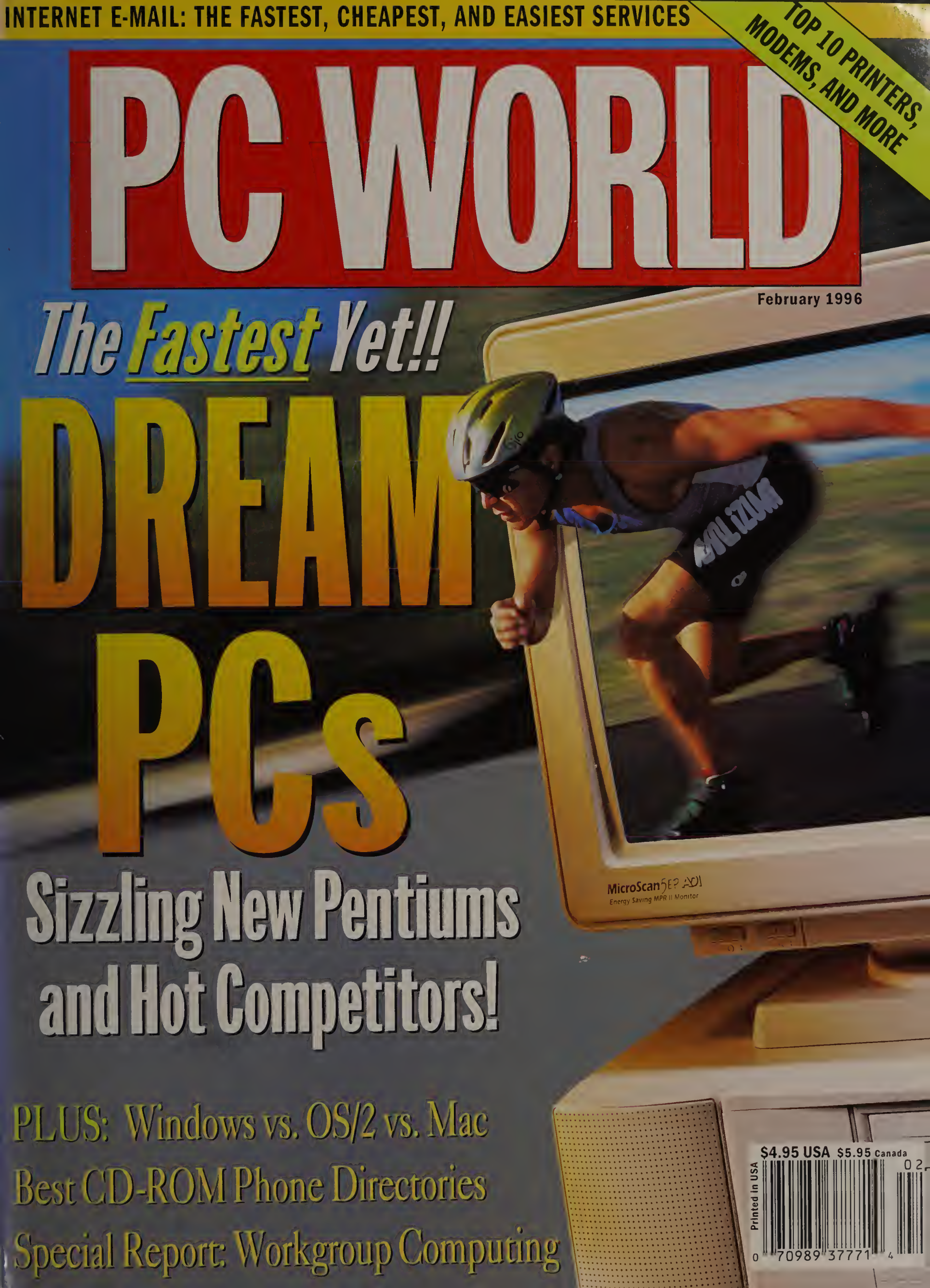

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MultiSync® XV15+™
15" Flat Square Technology CRT
(13.8" viewable image size)
Max. Res.: 1280 x 1024 NI at 60Hz
OptiClear Screen Surface
Front-mounted Digital Controls
Plug and Play Compatibility

MultiSync® XV17+™
17" Flat Square Technology CRT
(15.6" viewable image size)
Max. Res.: 1280 x 1024 NI at 60Hz
OptiClear Screen Surface
Front-mounted Digital Controls
Plug and Play Compatibility

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Designed for Microsoft Windows 95

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Key #82031.

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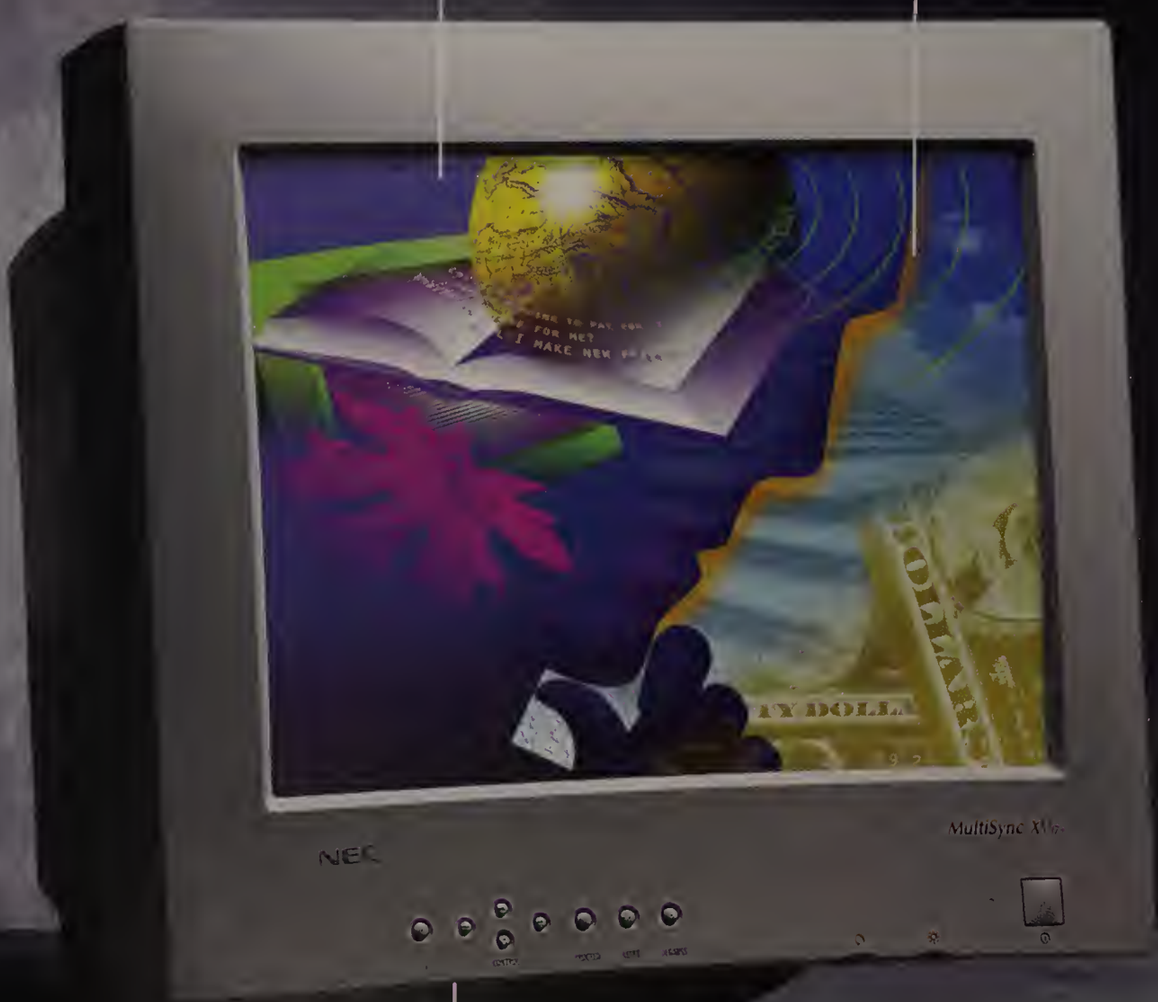
THAT SCATHING REVIEW LED US TO THESE IMPROVEMENTS.

Plug and Play Compatibility for Windows 95

Lets you simplify installation.

OptiClear Screen Surface

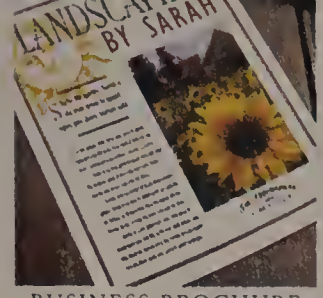
Enhances contrast while also eliminating glare.



Front-mounted digital controls on the MultiSync XV15+

Now both the XV15+ and XV17+ allow for quick and easy image adjustments.

What Can I Do?



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PC WORLD

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As hot new systems with the latest processors from Intel, Cyrix, NexGen, and AMD vie for your dollars, we sort out your best buy. Is a Pentium Pro worth the extra $1000 over the price of plain Pentiums? Should you consider a PC with Cyrix's 5x86 or 6x86? Or wait for the Nx686 or the K5 chip? Here's our road map to picking your dream machine.

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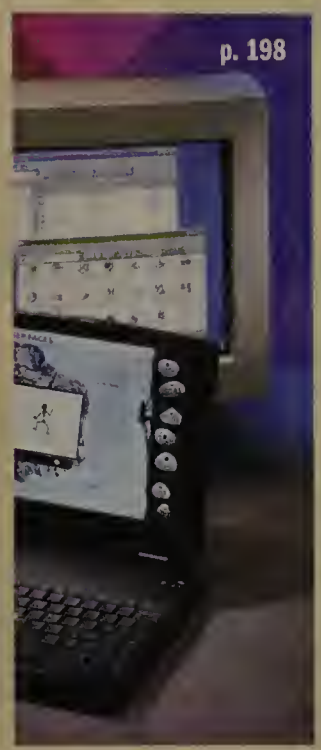

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Meridian 400 Subnotebook

WINDOWS MAGAZINE 1995 WIN 100 May 1995

"ZEOS is out to prove that good things do come in small packages with its Meridian 400C subnotebook," reported *Windows Magazine.*

At 3.9 pounds, the Meridian 400 is molded with a special carbon-fiber material that cuts weight and improves durability. And with a DX4-100MHz processor *standard*, it may well be the highest performance subnotebook available; "faster than a speeding desktop" is how *Computer Shopper* described it.

In addition to great performance, you also get hard drives to 350MB, RAM that's user upgradable to 20MB, two Type II PCMCIA slots, an external ultra-light 3.5" 1.44MB floppy drive (included in Packages 2 and 3) and your choice of active matrix or dual scan color screens. Amazing!

Meridian 800 Notebook

WINDOWS MAGAZINE 1995 WIN 100 May 1995

"The 800A notebook offers sleek styling, solid construction and hot performance....one of the fastest notebooks we've ever tested," said *Windows Magazine.*

At 6.3 pounds, the Meridian 800 full-size notebook is light enough to travel anywhere yet, with its whopping 9.5" active matrix color display, is large enough to use for presentations and everyday computing.

To complete the package, you also get a DX4-100MHz CPU, up to 20MB of user-upgradable RAM, a removable hard drive to 810MB, a built-in 3.5" 1.44MB floppy drive and PCMCIA slots supporting two Type II or one Type III devices. Full desktop features that fit in your briefcase!

Meridian 850 Notebook

"On our Graphics Winmark 95 tests...ZEOS's Meridian 850C grabbed the top position. The ZEOS 850C again finished first on our Disk Winmark 95 tests," reported *PC Magazine.*

Imagine, today's most advance computing capabilities wrapped up in a 6.8 pound package. With features including your choice of Pentium® processors, a 256K synchronous SRAM cache, user-upgradable memory to 32MB, removable hard drives to 1.3GB, PCMCIA support for two Type II or one Type III devices

and a built-in 3.5" 1.44MB floppy drive, this is the notebook computer that rivals today's most advanced desktops!

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Package 1

	400C	800A
DX4-100	$1495	$2695

- 4MB RAM
- 260MB IDE hard drive
- 800: Internal 3.5" 1.44MB floppy drive
- 400: 7.9" dual scan display; 800: 9.5" active matrix display
- MS-DOS 6.2 & Windows for Workgroups 3.11
- MS Works

Pentium® Processor	850C
75MHz	$2895
90MHz	$3095

- 8MB RAM, 256K synchronous SRAM cache
- 528MB IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- 10.3" dual scan display
- Integrated 16-bit stereo sound
- **MS Windows 95** or MS-DOS 6.2 & Windows for Workgroups 3.11
- **MS Works 95** or MS Works

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Package 2

	400C	800A
DX4-100	$1795	$2895

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- 350MB IDE hard drive
- 3.5" 1.44MB floppy drive. 400: External, 800: Internal
- 400: 7.9" dual scan display; 800: 9.5" active matrix display
- Custom nylon carrying case
- **MS Windows® 95** or MS-DOS 6.2 & Windows for Workgroups 3.11
- **MS Works 95** or MS Works

Pentium® Processor	850C
75MHz	$3395
90MHz	$3595

- 16MB RAM, 256K synchronous SRAM cache
- **810MB** IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- 10.3" dual scan display
- Integrated 16-bit stereo sound
- Custom nylon carrying case
- Extra battery
- **MS Windows 95** or MS-DOS 6.2 & Windows for Workgroups 3.11
- **MS Office Pro 95,** or MS Office Pro

Package 3

	400C	800A
DX4-100	CN! $2095	CN! $3195

- 8MB RAM
- IDE hard drive. 400: 350MB, 800: 528MB
- 3.5" 1.44MB floppy drive. 400: External, 800: Internal
- 400: 7.9" dual scan display; 800: 9.5" active matrix display
- **14.4 PCMCIA fax/modem**
- Custom carrying case. 400: Leather, 800: Nylon
- Extra battery
- **MS Windows 95** or MS-DOS 6.2 & Windows for Workgroups 3.11
- **MS Works 95** or MS Works

Pentium® Processor	850C
75MHz	$3795
90MHz	CN! $3995

- 16MB RAM, 256K synchronous SRAM cache
- **1.3GB** IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- 10.3" dual scan display
- Integrated 16-bit stereo sound
- External amplified speakers
- **28.8 PCMCIA fax/modem**
- Custom nylon carrying case
- Extra battery
- **MS Windows 95** or MS-DOS 6.2 & Windows for Workgroups 3.11
- **MS Office Pro 95,** or MS Office Pro

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April 25, 1995
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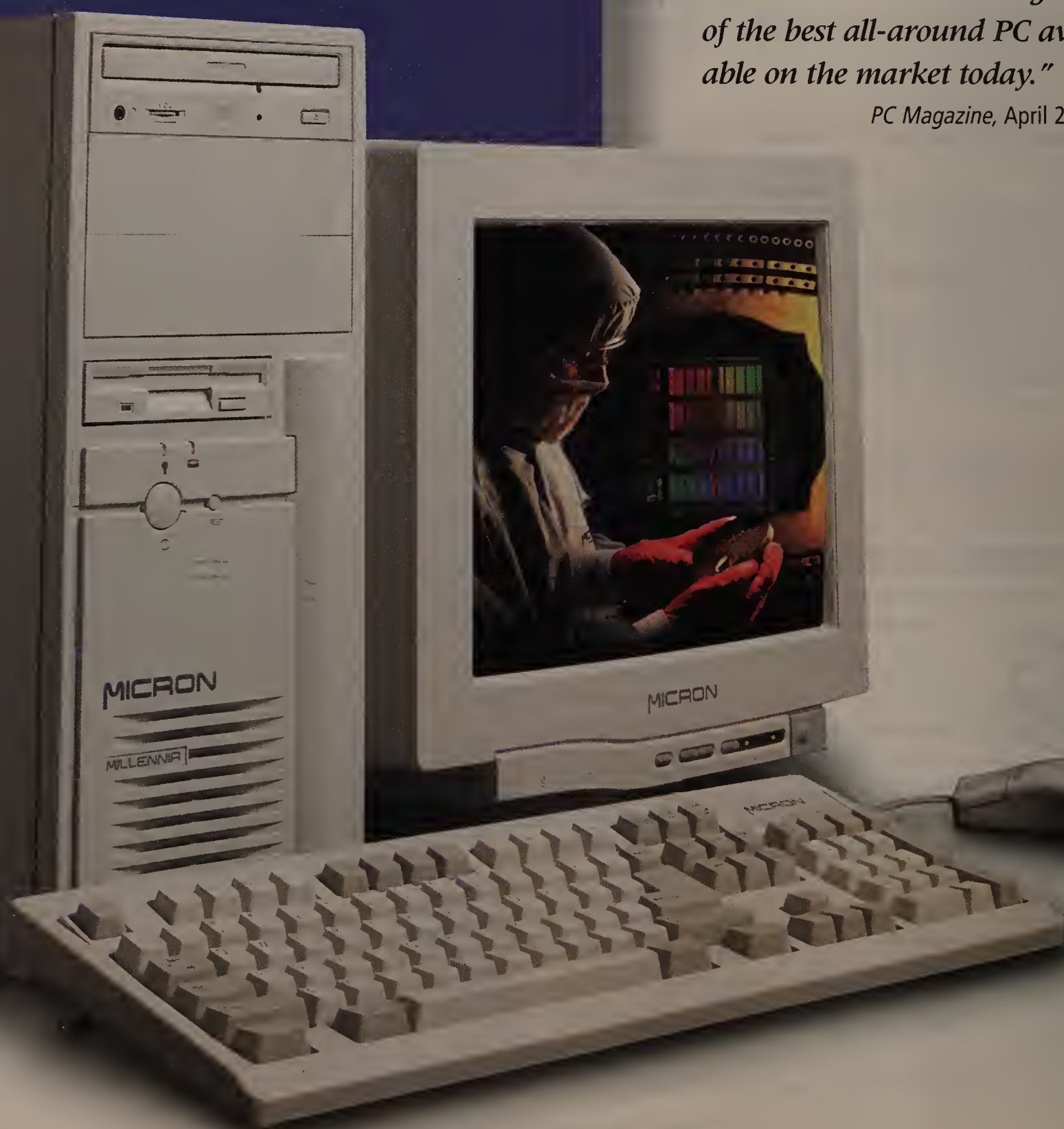
PC Magazine, April 25, 1995



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- Microsoft Windows 95 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs

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• 15" Micron 15FGx, 1280NI, .28mm monitor
$4,199 Business lease $143/month

C • 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
• 17" Micron 17FGx, 1280NI, .26mm monitor
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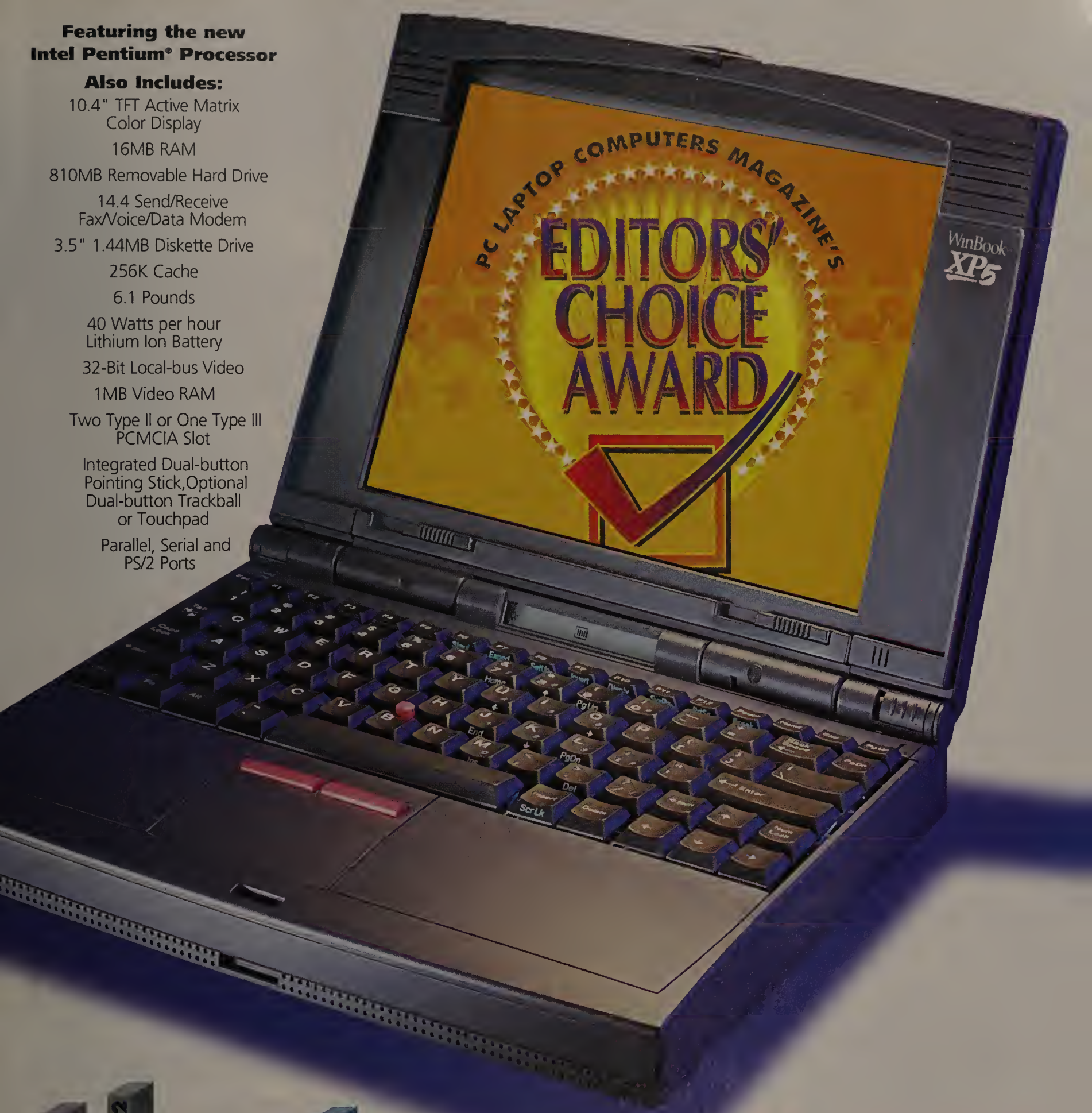

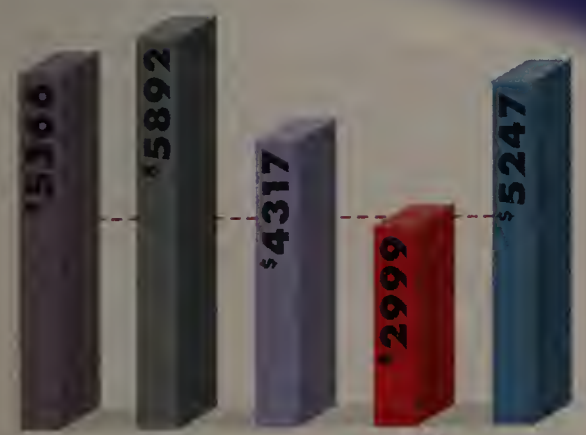

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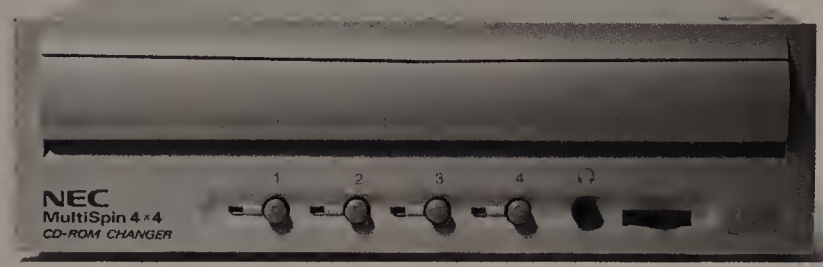

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Are You Being Served? Will Windows 95 Serve You?

If you're like the majority of us office workers, both the programs and the data you use on your desktop computer come to you from a server. When the server slows, your PC gets stuck waiting—and you keep your boss waiting for that urgent report. Even worse, an outright server failure can stop your desktop PC from helping you do your job. Whether you're officially in charge of the server or not, it can affect your job performance. That means it's time to start paying close attention to server performance and reliability.

PC World has joined forces with *Network World* to create the Network World–PC World Network Test Center. Located near Houston, the Center will begin life with an intensive program to test servers. Under the leadership of Executive Editor Eric Bender in our Boston office, we will use test results to bring you ratings of the PC World Top 10 Servers, with five spots allotted to workgroup servers and five to enterprise servers. You'll find a sneak preview of our approach to server testing in this month's special report on workgroup computing. You'll also hear from Bill Rinko-Gay, the network test center director, with whom four of us at *PC World* have worked in previous lives. We're delighted to have recruited once again one of the top experts in performance testing. Coming to us this time from the Compaq Computer competitive analysis lab, Bill is charged with overseeing a program to test servers both in file/print operations and as application servers. Reader surveys have told us to run our server tests with two network operating systems: Netware 4.*x* and Windows NT. Bill explains our general approach to testing in "Launching Our Server Lab."

Also debuting in the workgroup computing special report is *Group Problems, Group Solutions*. Modeled on our popular *Real Problems, Real Solutions*, the new column provides first-person accounts of how real workgroups use PC software to forge ahead. In future workgroup computing special reports, look for coverage of network operating systems as well as servers and workgroup applications.

Windows 95 Faces Its Foes

Once Windows 95 was transformed from history's biggest beta program into a shipping product, we began preparing a systematic review comparing the most hyped operating system ever to your real alternatives. Our review holds Windows 95 up to the same stringent standards as OS/2 Warp, Windows NT, and the Macintosh OS and shows where each of these contenders outshines Windows 95. Rather than testing usability with a group comfortable with Windows 3.1, the usability test subjects had experience with a variety of other operating systems, including the Macintosh and OS/2. To avoid inadvertently biasing the test in favor of Windows, we designed and conducted the usability tests in collaboration with *Macworld*. Usability weighs heavily in the review's findings and recommendations because your relationship with your PC's operating system could last longer than many marriages do. In addition, we looked at performance, price, and features, as well as many other considerations. Our recommendations are designed to help you make the right choice, even if your needs diverge from those of mainstream desktop PC users moving on from Windows 3.1. We also provide ample advice for just such mainstream Windows users.

When E-Mail Electrons Linger

You send e-mail to get your messages through quickly, but do they? When *PC World* recently sent hundreds of e-mail messages and tracked the time it took to deliver them, the results were sometimes surprising. Do you expect your Internet messages sent via CompuServe to arrive in less than seven hours? Or Internet messages received via America Online to reach you just as quickly? You could be out of luck. In "Getting the Message: The Great E-Mail Shoot-Out," Contributing Editor Judy Heim explains what it costs and how long it takes to get Internet e-mail uploaded and delivered through America Online, CompuServe, MCI, Microsoft Network, Prodigy, and direct Internet connections. The great mystery is why e-mail, which consists of electrons or photons, can sometimes take several hours—definitely longer than a fax and, if the message dallies until after the close of the business day, no faster than an overnight package. One interesting theory is that electrons sometimes stop in taverns along the information superhighway to relieve the tension of constantly traveling at the speed of light.

Usability weighs heavily in our review because your relationship with your PC's operating systems could last longer than many marriages.

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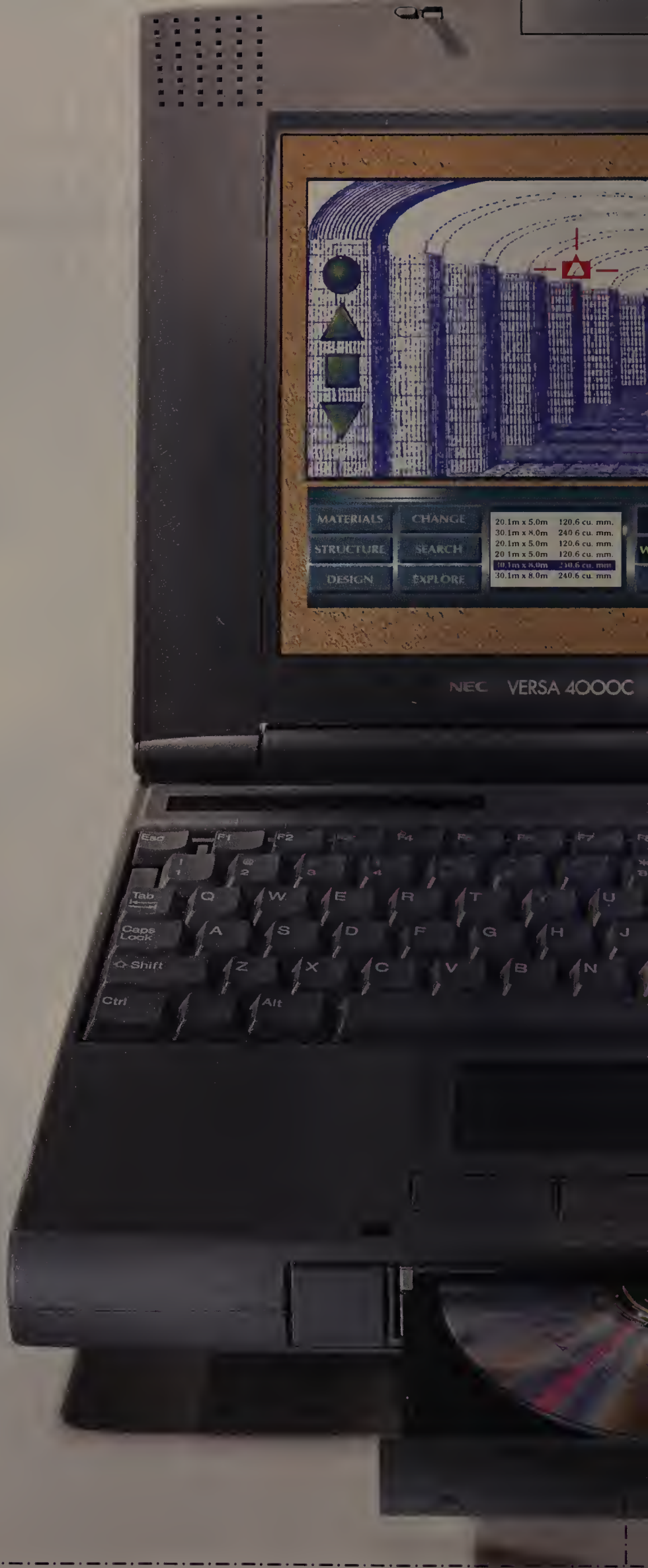

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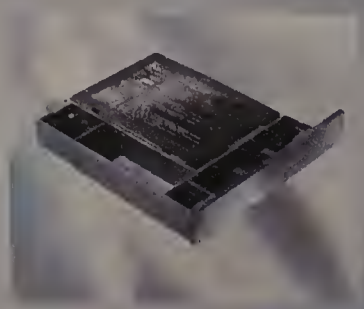

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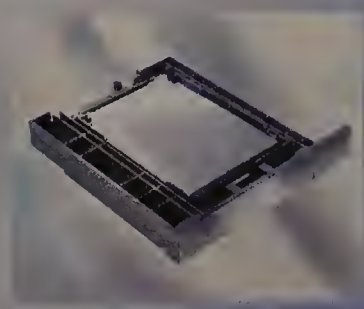

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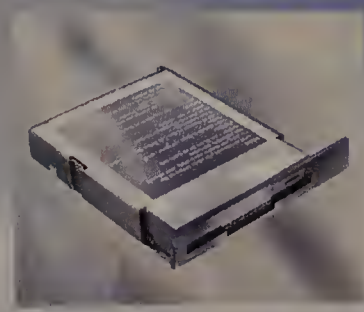

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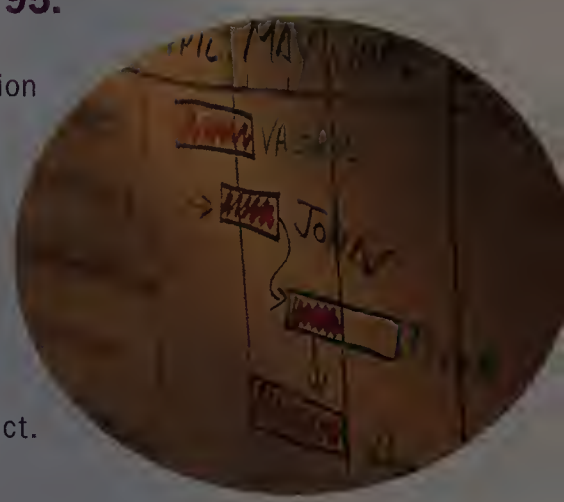

Now you can manage projects more simply, more smoothly, by communicating project information as it occurs. With new Microsoft® Project you can convey project status quickly and effectively so your boss, customers, and coworkers are always in the loop. From sharing task deadlines and responsibilities, to letting people know about changes and the impact they'll have on the deadline, you have the tools to organize your projects into manageable steps and keep them moving in the right direction. New Microsoft Project unlocks the doors of communication and gives you the power to navigate the most efficient route to a successful end product.

Graphical views let teammates visualize where the project is going.

With Microsoft Project you can display project data in ways that everyone can understand. Great-looking Gantt Charts integrate text, timelines and graphical bars so everyone can see start and finish dates, interdependencies and task assignments. Throughout your project, you can also use a Monthly Calendar report to share your plan in a format that's clear and easy to read. And since Microsoft Project shares many of the same key commands with other Office applications, it will be easy to create schedules and reports. But if at any time you need help, type in a question and the Answer Wizard gives you the information you need. Microsoft Project helps you illustrate every phase of your project so you and your team keep your goals in sight.

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Keep everyone moving on the same track with open lines of communication.

Microsoft Project is completely integrated with a wide range of e-mail systems* and Schedule+ so that with a single click, changes and additions are immediately distributed to and from teammates. Assignments, task changes, and progress can be communicated and updated without ever reentering information, so you save time and eliminate mistakes. And because Microsoft Project is a member of the Office family, sharing data between programs is easy. For example, you can start building a schedule by simply dragging a task list out of Microsoft Excel and dropping it directly into your Microsoft Project plan. You keep communication clear and information consistent and your project continues to move exactly the way you planned.

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   (From $100 to $999 use purchase
   order terms 2-10 Net 30)
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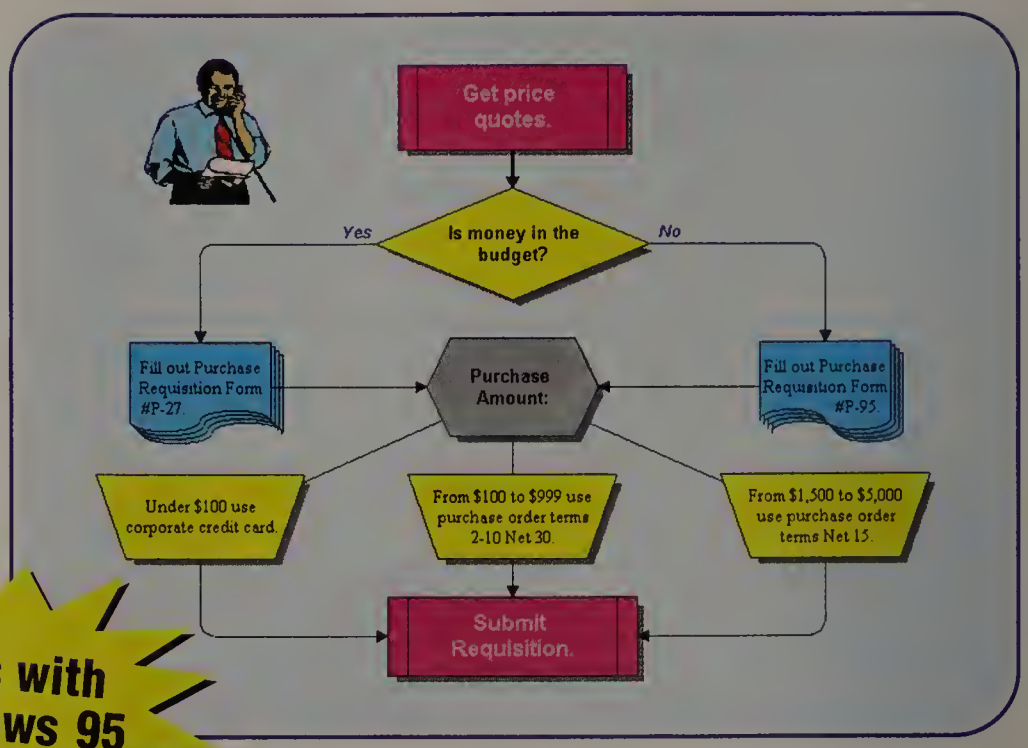

Runs with Windows 95

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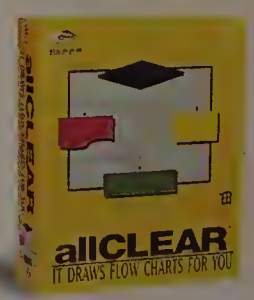

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Circle 26 on reader service card

Pentium Prowess, Incompatible Upgrades

Red in the Face

I read Editor in Chief Phil Lemmons's comments regarding the Pentium Pro and Windows 95 with great interest [*In This Issue*, December]. The comment "Intel's challenge will be to avoid embarrassment when 150-MHz Pentiums run Windows 95 better than the Pentium Pro does" is so far off the mark as to be laughable. Intel has nothing to be embarrassed about regarding the Pentium Pro, as it does exactly what it was engineered to do: deliver optimum performance for 32-bit code.

The company that should be embarrassed and certainly "challenged" is Microsoft. Intel delivered the processor, but Microsoft failed to deliver an operating system capable of utilizing design advances Intel made. People paying the extra $1000 for a Pentium Pro most likely have little use for legacy applications and will not be using Windows 95.

Richard Courtois, Watertown, Wisconsin

Editor's response: Intel has thus far done a masterful job of issuing new processors that accelerate old programs as well as running new ones written for them. The Pentium Pro is surprising because it departs from this tradition [see "Pentium Pro Veers off Course," *Top of the News*, December]. Whether this departure was wise depends on whether you favor using pure 32-bit software or making a smooth transition to a much improved mainstream desktop operating system.

Microsoft made it clear that portions of Windows 95 would remain 16-bit for reasons of backward compatibility. And it was quite predictable that many users would continue to run 16-bit applications even in a purely 32-bit operating system.

If you have ample money to buy new software and have no use for legacy applications, Plug and Play, or an improved user interface, then by all means grab a Pentium Pro and lead a pure 32-bit life. Microsoft has no cause for embarrassment, since it has long had a 32-bit operating system, Windows NT. IBM has OS/2, although that falls short of the goal of 32-bit purity. And there's always UNIX.

—Phil Lemmons

Getting Connected at Top Speed

November's *Top of the News* discusses a problem with certain new V.34 modems failing to connect at 28.8 kilobits per second. That described my modem perfectly, though I had assumed it was just a problem to be expected. I decided to contact the manufacturer (Zoom) anyway, and sure enough, I needed an updated ROM, which they promptly sent me. I am now zipping away at a full 28.8 kbps almost every time, and I have you folks to thank. I figure if I can get one useful piece of information out of each issue, my subscription is worth it—and so far I haven't been disappointed.

Charles Colchamiro, Brooklyn

Unspent Cache

After reading "Best Upgrades for Your 486" [November], I feel more emphasis should have been given to the fact that not all 486s can be upgraded to their fullest potential. This is because some of the BIOSes in existing systems cannot recognize the enhanced cache included in some upgraded Intel CPUs.

I recently purchased a DX4-100 upgrade CPU, installed it in my IBM 486SX-33, rebooted, and then received a 'cache error' message. I contacted IBM for technical support, and I was told that the BIOS would not recognize the additional cache memory present on the upgrade chip. Furthermore, I was informed that IBM had no plans to correct this, and that the best that I could do was to install a 486DX2-66 upgrade. I suppose that even if a CPU fits the socket, it's always best to check compatibility in all areas of the system prior to the purchase or installation of an upgrade.

Gabriel Gill, Phoenix

Top of the News

PENTIUM PRO VEERS

New PCs using Intel's next-generation Pentium Pro falter running mainstream Windows software. Sure, they run Windows NT fine, but will average users care?

OFF COURSE

Breaking News

Take Another Look

I feel betrayed by your review of Janna Contact 95 ["First Look: New Software for Windows 95," October]. The product is laden with numerous serious bugs and is incredibly slow. Documentation is poor, and Janna expects you to continually download patches as it works on the product. The collateral materials read well, but the product simply does not work.

Albert T. Kruzel, Austin, Texas

Author's response: When reviewing the early beta release of Janna Contact 95, I focused on the program's potential, not performance. Alas, after reviewing the shipping version in Janu-

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ary's roundup of personal information managers ["Software for the Perpetually Overworked"], I agree with Kruzel. Contact 95 disappoints on several levels. Journalists expect to take some lumps when reporting on beta software. Customers expect performance. And they should get it.
—*Peter Scisco*

More Privacy, Please

The November article "Invasions of Privacy" requires clarification. First, the article suggests that all information that prospective insurers collect from applicants, for life, disability, or health insurance policies, is given automatically to the Medical Information Bureau. In fact, applicants authorize the insurer to collect only relevant medical records about their insurability. If an applicant has a condition significant to longevity, then the insurer sends a brief, coded report to MIB.

Second, the article alleges that MIB has codes for "sexual deviation" and "dirty appearance." MIB absolutely does not require or maintain codes of that type. All such codes were eliminated in 1974 when insurers updated their underwriting methods.

Third, the article states that it took one consumer "nearly a year" to correct his MIB record. MIB and insurers are strongly committed to prompt access to and easy correction of MIB records. Our goal is to disclose or correct records within 30 days, and we usually beat that target.
Neil Day, president,
Medical Information Bureau,
Westwood, Massachusetts

I want to correct an inaccuracy that appeared in your November issue ["Invasions of Privacy"]. The U.S. Postal Service has never sold any name or address list to marketers or any other firm. In fact, we are barred by federal law from doing so.
Sandra M. Harding, media relations representative, U.S. Postal Service,
Washington, D.C.

Author's response: The U.S. Postal Service does share change-of-address records with credit bureaus such as TRW and government agencies like the IRS to keep their data current. In turn, TRW sells lists of people who have just moved to marketers, who follow with junk mail offering move-in specials. A couple years ago, congressional hearings lambasted the Postal Service for sharing names and addresses with other organizations.

As for the Medical Information Bureau's statement, I stand behind my reporting in the story.
—*Jeffrey Rothfeder*

Notebooks at the Airport

Regarding "Dangerous Security?" [*Feedback*, December], it is possible for an airport security scanner to damage computer equipment, although as airports update equipment, it does become less likely. The danger does not lie in the X-rays themselves as much as in the motors that pull baggage through the scanner. On some older machines, the motor can generate a significant magnetic field, which can lead to problems with electrical devices. Requesting that security hand-inspect the computer is still the best choice.
Aric Buckholt, Internet

Corrections and Clarifications

An incorrect telephone number was provided for EasyTutor Learn Windows 95 (*New Products*, November). The correct number is 011-44-181-743-9900.

The mailing address for the Direct Marketing Association Mail Preference Service ("Invasions of Privacy," November) is P.O. Box 9008, Farmingdale, NY 11735.

The correct location for Gateway 2000's recently opened customer support center (*Top of the News*, December) is Kansas City, Missouri.

In December's *New Products*, we incorrectly reported the operating systems that Symantec's Norton Anti-Virus runs under. In addition to working with DOS and Windows 3.*x*, Norton Anti-Virus is available in a 32-bit Windows 95 version and works on NetWare with the Norton NetWare Loadable Module.

The correct address for NetOffice's FaxWeb site (*Real Problems, Real Solutions*, January) is **http://www.netoffice.com/**.

PC World regrets the errors.

Letters *welcomes your responses and ideas.* *See page 14 for contact information.*

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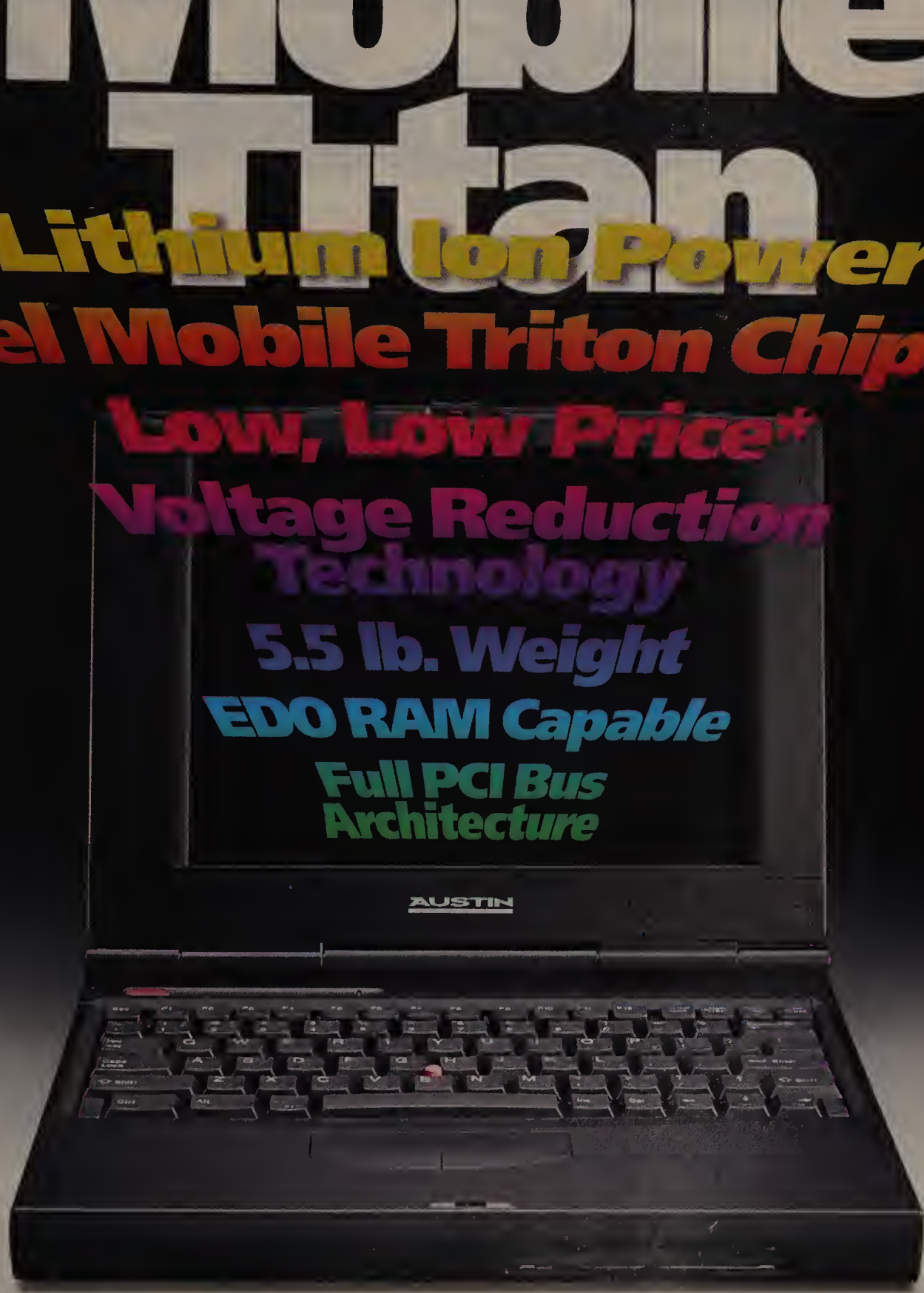

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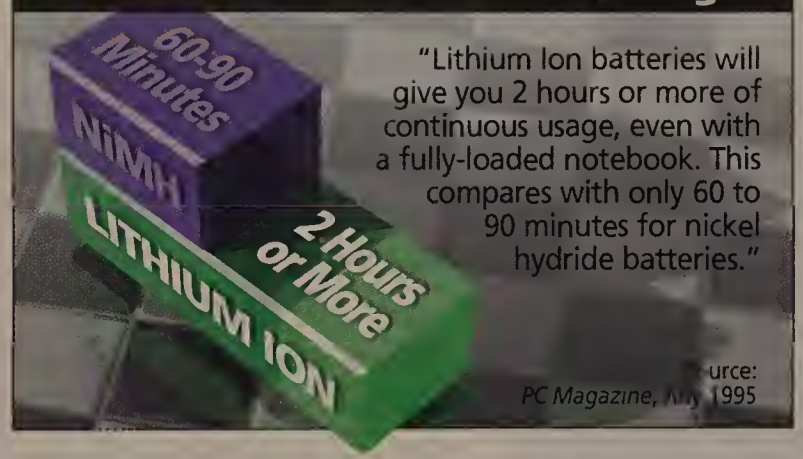

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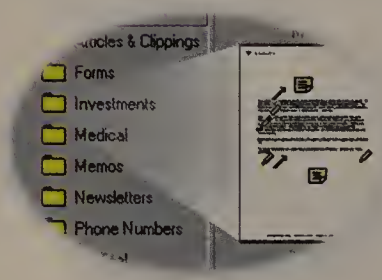

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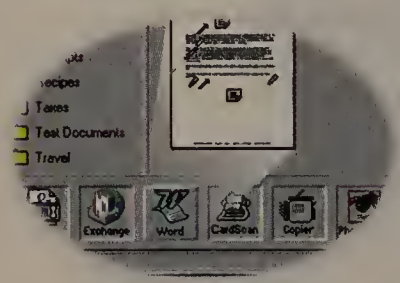

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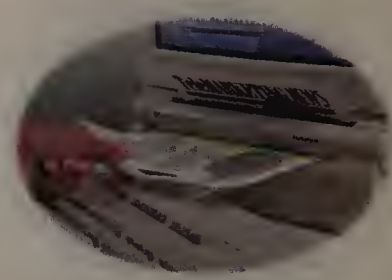

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A New Lease on Your Hardware's Life

Remember the Greek myth of Sisyphus? He's condemned to spend eternity rolling a boulder up a mountain, only to have it roll down, forcing him to start all over again. The modern-day equivalent of Sisyphus's curse: the constant race to keep up with the next CPU from Intel or operating system from Microsoft. It seems that as soon as you purchase a new personal computer or software, faster or sleeker versions appear to make your purchases obsolete. This month Corran Ashby, a computer network services manager for the Christian Broadcasting Network in Virginia Beach, Virginia, tells why leasing is a smart alternative to the PC purchase spiral. —*Editor*

Burning Cash

I've never met a chief financial officer who wasn't interested in controlling cash flow. Nor can I recall any senior executive who thinks it's a good idea to spend cash on something that, after just 30 months of use, becomes a productivity sink for employees and is worth nothing as a business asset. Nevertheless, just about every organization I know burns cash purchasing PCs.

I work as a network services manager for a nonprofit broadcasting company; of its 1000 employees, 820 are PC users. Our local area network links workers in three buildings, letting us share our proprietary database and communicate via e-mail. We run nearly 100 different applications, ranging from applications developed in-house to off-the-shelf packages such as Microsoft Office, WordPerfect, and Act.

When I started working at CBN, the organization was running a wide range of machines, from 8088s to 486s. CBN was also migrating from a centralized mainframe to a PC-based LAN. And PC applications began demanding more and more speed and memory.

We clearly needed to have more-powerful machines. Accordingly, we invested $1.2 million—which is a huge sum, especially for a nonprofit—and fully one third of our technical staff's time to move to the LAN and put 200 additional PCs on our desktops. We also had to spend a full week just putting the purchase orders through the necessary internal approvals and then sending them to the vendors.

Though adding several servers, a network, and 200 new desktop computers helped, it was only a drop in the bucket compared to what we really needed—a new 486-level PC on every desk. Compounding the problem, the software we used kept coming out with updated versions, and Intel kept announcing faster chips—processors, it seemed, were doubling in speed every 18 months. Without an unlimited budget, there was no way to stay current.

Although I was responsible for purchasing the PCs and managing the network, I knew it was folly for us to stay on the upgrade treadmill. Since I had long experience with Dell computers and had always gotten good support from them, I asked our Dell sales representative about leasing computers.

Dell offers three leasing plans: First, there's a lease-option, in which you lease a computer for a set monthly fee, with an option to purchase it at the end of the lease. Then there's a balloon lease, in which you lease the PC for a very low monthly fee (say, $100 per month), then buy it for the remaining amount of the purchase price at term's end. The third choice is a market rate lease, which lets you either buy the computer at the end of the lease for its current market value, or return it.

Corran Ashby is a computer services manager for the Christian Broadcasting Network.

We opted for a 30-month market rate lease for 100 new Pentium PCs with an average configuration of 16MB of RAM and 1GB hard drives. These PCs had an estimated value of $4000 each. Our contract also lets us add new PCs to the agreement as needed. In 30 months, we return the systems, having paid Dell nearly $3600 for each one.

If paying $3600 to use a PC that goes away after 30 months seems exorbitant, consider the following benefits. First, it simplifies support and maintenance. We never need to upgrade PCs, since leased units are returned in 30 months. This saves our technical support department about $30 per PC per month in labor costs alone. Nor do we need to store parts, which are costly to keep in

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inventory: Dell sends us needed parts or equipment in 24 hours. Although we provide our own technical support, Dell can also provide support if we want it.

Leasing also brings a huge tax deduction. You can write off 100 percent of the cost of leased equipment. Purchased equipment, on the other hand, depreciates in value; most PCs are fully depreciated within five years by IRS rules, and a company with hundreds of out-to-pasture PCs loses hundreds of thousands of dollars in productivity annually. Leasing helps cash flow. With a lease, instead of having to plunk down $4000 for every new PC we buy, we pay a small monthly fee, leaving us with cash on hand to use for other things.

Finally, we're spared the bother of getting rid of old equipment. Dell collects old PCs, regardless of condition or manufacturer, and gives credit toward the purchase or lease of a new Dell machine.

Read the Fine Print

When investigating leases, keep in mind some caveats. First, avoid leasing laptops: They can easily be lost or stolen, and you'd be stuck holding the bag. Second, in negotiating a lease, watch the fine print. Make sure the contract includes support covering the life of the lease, not just the first year. Third, make sure you negotiate a low interest rate. It's best to aim for an interest rate factor of less than 0.035 percent, which helps you aim for a lease price that is less than the purchase amount. Finally, make sure you are not paying a total amount that is more than the PC itself is worth. For all these reasons, it's wise to have your accounting and legal departments involved in a lease agreement.

Leasing has proved to be by far the most sensible way for us to go. By taking this route, we've not only kept up with the technology race, but also the money, time, and labor races.

Edited by Bronwyn Fryer

Bronwyn Fryer is a contributing editor for PC World. *If you use PCs to manage people and other resources in a business environment, we want to hear from you—we pay $300 for published columns. See page 14 for contact information.*

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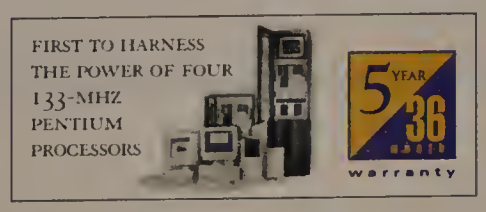

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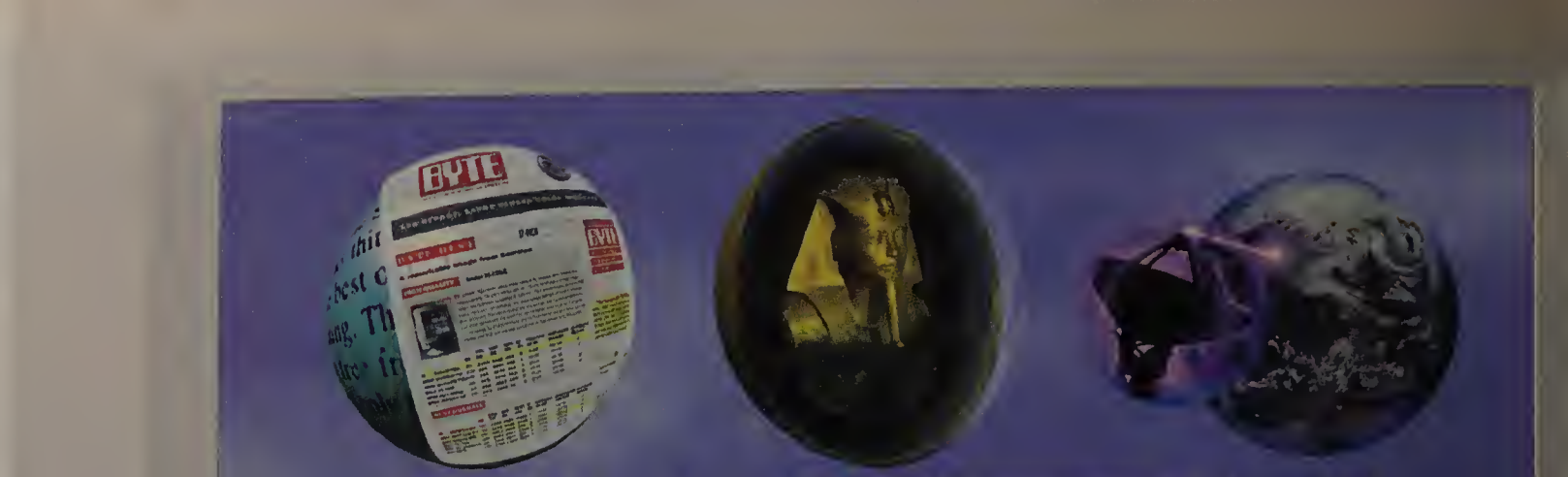

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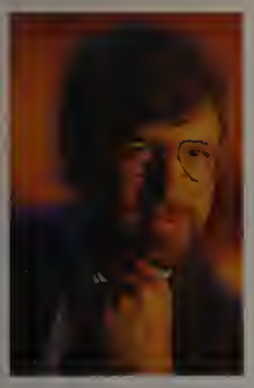
The $500 PC: Dumber Is Dumb



It's not real yet, but when and if it arrives, it should cost about $500. It's got a bunch of names, including "Web appliance" and pundit Richard Shaffer's clever "Browser Boy." It's all the rage among PC-phobic high rollers like Oracle chair Larry Ellison and Sun Microsystems honcho Scott McNealy. It's something completely different from what we've come to expect from the PC revolution: a machine so dumb that just about all it can do is connect people to the World Wide Web.

You and I won't buy one, at least not for ourselves. So who will? Millions of Americans too stupid or lazy to learn how to use a computer and hook it up to the Internet, or so goes the theory. Full-fledged computers are supposedly just too darned difficult for Mr. and Ms. America to understand. But Browser Boy lets Jed, Granny, Jethro, and Ellie Mae simply hook one end to the phone outlet, plug the other into the TV set, and yahoo, they're wired!

Maybe. But there's a long, long list of underpowered, incompatible single-purpose machines that didn't quite set the world on fire. Smith-Corona bet its company on electronic typewriters and went bust. Wang went broke mostly by standing pat with its stand-alone word processing machines. And manufacturers of dumb computer terminals are shadows of their former selves.

Wrong paradigm, say the Browser Boy partisans. Think about some cheap, simple, single-purpose computers that people really like: video game machines. They're easy to hook up and use. They're inexpensive. Link a console to the Web, and the world will beat a path to your phone jack.

Nice idea, but most game units did not cost $500 or even $300. They were so cheap that when their appeal faded, they could take their place in the closet with the hot dog cookers and salad shooters until the next garage sale.

Besides, people have been predicting the rise of game machines for years. Every six months or so, some game dude writes about how their microprocessors run rings around the ones in traditional computers. This, of course, totally misses the point. Game machines are utterly limited: They don't have to worry about any kind of input but what comes from the controller and cartridge or output beyond what goes to the television set.

The Net works differently. It hasn't been approved and tested by Nintendo. Certain Web pages inevitably crash certain browsers. Many Telnet sites require VT-100 terminal emulation. And what's going to happen when someone invents a jazzy new virtual reality extension your B-Boy can't quite handle?

It's the Newton Plus!

The chimerical Browser Boy has a way of mutating depending on who you talk to. Take what might be called the "enhanced Newton" model, and imagine Jethro's apoplexy when he tries to download some pinups of Newt Gingrich, sees them crawl down the screen in dim black on silvery gray, and discovers he can't print them out to hang them on the wall. With the "TV add-on" model, envision the increase in optometrist visits as Jed and Granny try to make out the fuzzy fonts.

As an exercise, let's take the video game console and consider what else it would need to be a Browser Boy. First comes a keyboard, along with a pointing device. Then there's a modem (or, with office models, a network interface). Finally you need some local storage for downloaded software and probably more for your own data, since if you want to store stuff online, you can bet you'll have to pay for the privilege.

Can you build this machine for $500? If you include room for profit, probably not. And even if it includes some magical software breakthrough that initially makes it simpler to use than a Windows machine, the mystery of online connections and the anarchy of the Web guarantee that complexity and confusion will increase in a hurry. Besides, if simplicity were what we really wanted most, we'd all be using Macintoshes. If we wanted dependability, we'd stick with manual typewriters.

Imagine Jethro's apoplexy when he tries to download pinups of Newt Gingrich and finds he can't print them out to hang them on the wall.

You're not likely to toss your PC, but don't rule B-Boys out altogether. Online services and Net providers might just change the rules by giving them away the way the cellular phone companies give away phones—you know, free for a $500 commitment. Then would you get one for Uncle Jed? Maybe. Just try not to snicker when he e-mails you to ask why his messages look so fuzzy and why he can't save them on a little doohickey like you do.

PC World *Contributing Editor Stephen Manes is a columnist for the* New York Times *and coauthor of* Gates: How Microsoft's Mogul Reinvented an Industry *(Touchstone/Simon & Schuster, 1994, 800/223-2348).*

By Stephen Manes

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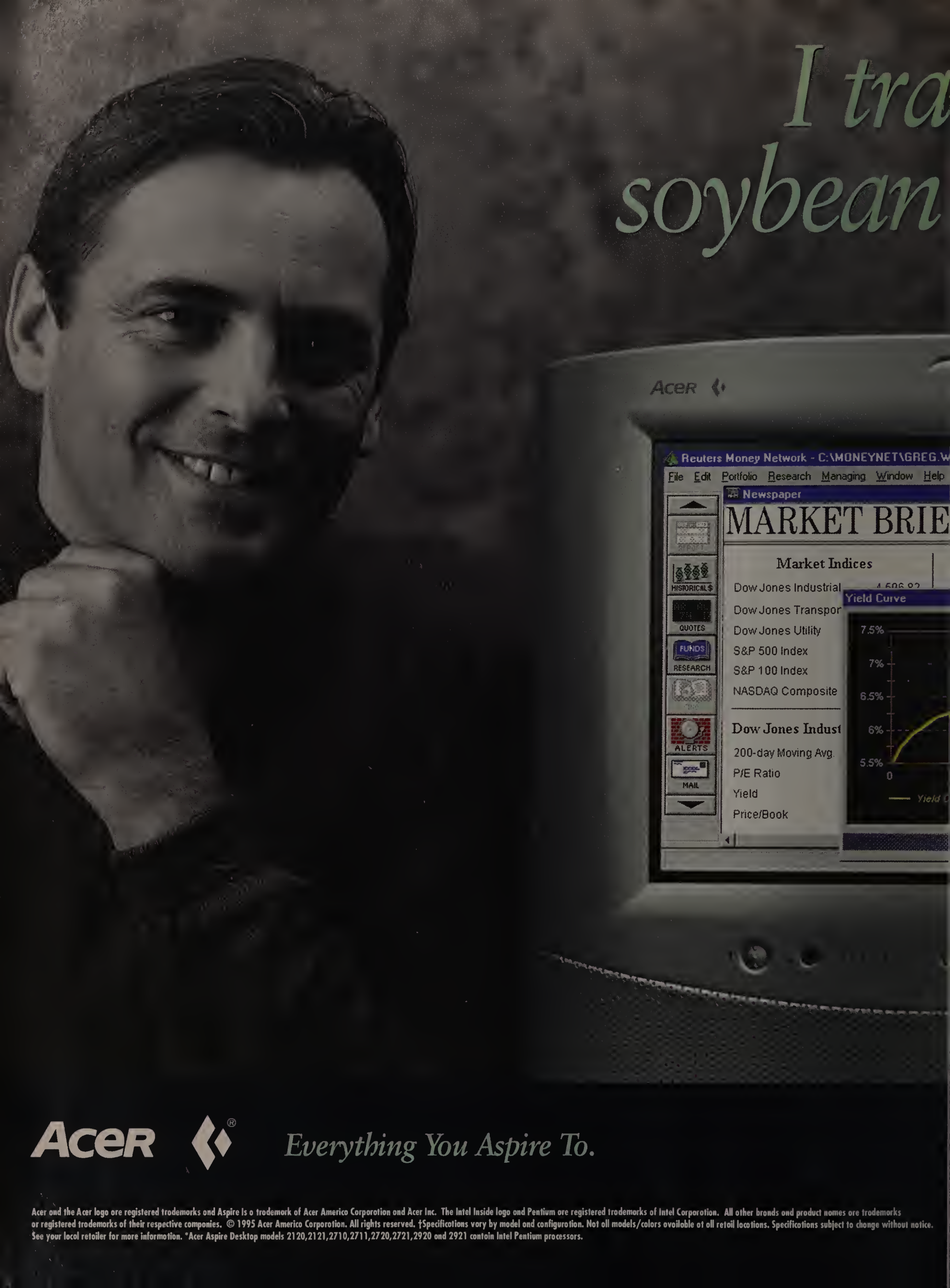
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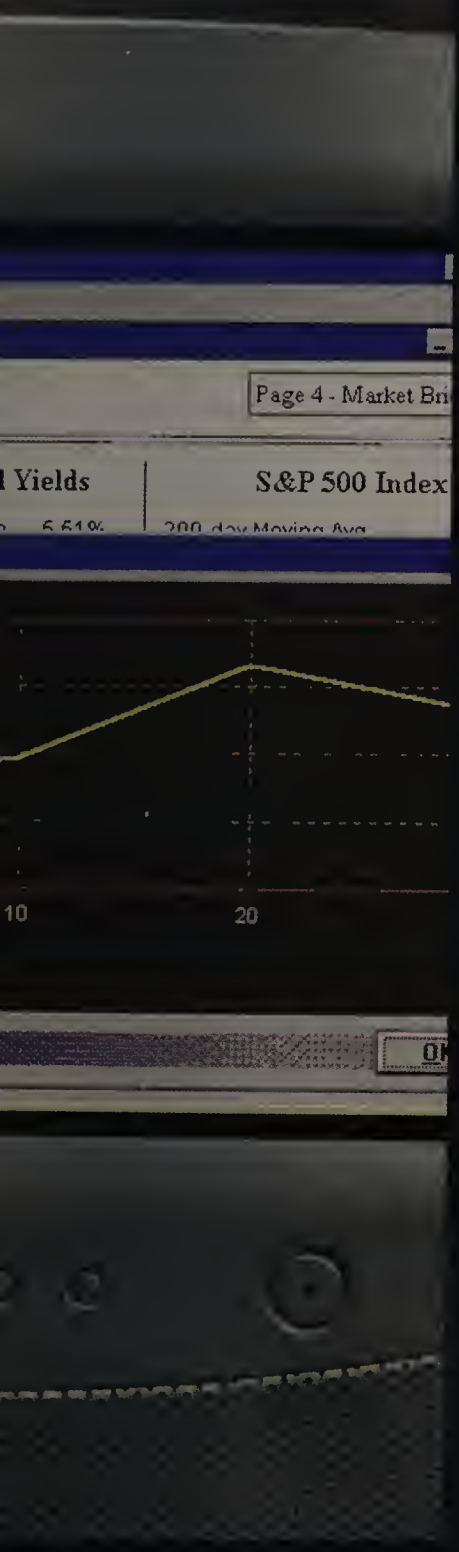

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166-MHz Pentium PCs

UNRIPE TODAY, SWEET

The latest Pentium PCs promise sizzling speed, once they get tuned up. But the first models we looked at were not stellar performers—and some aren't worth their extra cost.

No matter how you slice it, a 166-MHz Pentium chip should make any PC one hot tomato. But our test results for the first crop of preproduction Pentium-166 PCs are disappointing. Though systems from Micron and Maximus were among the fastest we've ever seen, others posted numbers comparable to those of ordinary 133-MHz machines—or worse. Does this mean the Pentium-166 is a big snoozer?

Not likely. Although a 166-MHz processor could theoretically run software as much as 25 percent faster than a 133-MHz chip, other components such as the bus, the graphics adapter, and the hard drive affect system performance significantly. Furthermore, years of testing at *PC World* inform us that first-off-the-line machines often score lower than similar systems we measure only a month or two later. In rushing to launch the latest PCs, manufacturers sometime skimp on tuning and optimization. It's just too early to say for sure how the performance of later 166-MHz Pentium PCs will measure up.

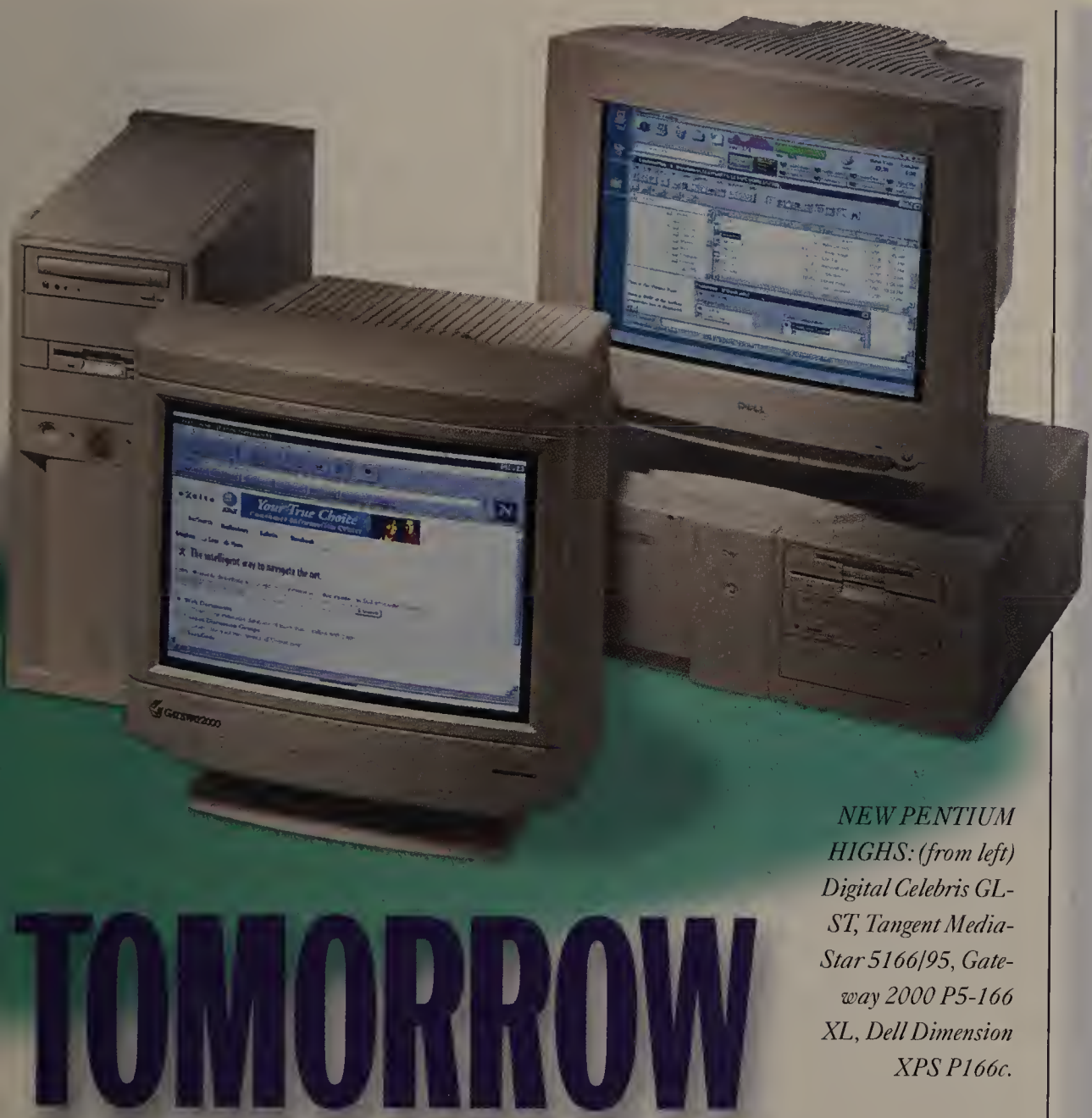
Some Pentium-166 systems will offer buyers terrific deals, while others come at a big premium. For example, Tangent plans to sell its amply configured P-166 system (with 16MB of RAM and a 1GB hard drive) for only $3295—the same price it asked only two months ago for an identically configured Pentium-133 PC. Dell is charging $3879 for the P-166 we tested, less than 5 percent more than the price of an equivalent P-133. These deals are clear price/performance winners.

Micron and Gateway 2000 are charging a higher premium for P-166s. Although these prices are sure to fall quickly, Micron is asking about 11 percent more for the P-166 system we examined than for an equivalent P-133. Gateway 2000's P-166 costs nearly 9 percent more than its comparable P-133. Given our so-so performance results, systems at these prices may not be worth the extra money.

First Taste Test

We evaluated six systems built on the new 166-MHz CPU, running tests under Windows 95. Two of the PCs, from Maximus and Micron, were also tested under Windows 3.1 and arrived early enough to be included in our cover story, "From 586 to Pentium Pro: Choosing Your Dream PC,"

Edited by Andy Reinhardt and Randy Ross



NEW PENTIUM HIGHS: (from left) Digital Celebris GL-ST, Tangent Media-Star 5166/95, Gateway 2000 P5-166 XL, Dell Dimension XPS P166c.

TOMORROW

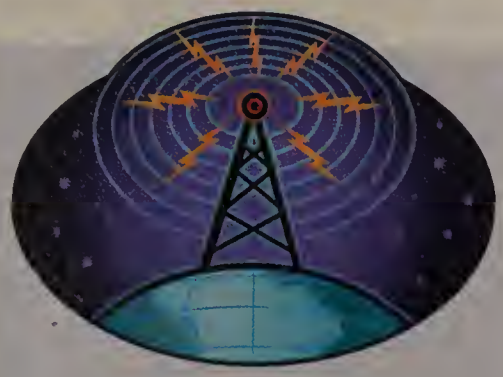
and in "Top 20 PCs: Pentium Power Play." Four others, from Dell, Digital, Gateway 2000, and Tangent, squeaked in under the wire for late-breaking coverage here.

Ironically, the systems that arrived earlier turned in better performance, while some of the last-minute arrivals were much slower than expected. The fastest P-166, the Magna Office from little-known Maximus, ran our Windows 95 tests 14 percent faster than the average of three preproduction 150-MHz Pentium PCs we previewed last month (see "150! 166! 200! Pentiums Soar," *Top of the News*, January). The runner-up Micron P166 Millennia Plus was about 11 percent faster than the P-150s.

The shocker was how poorly the new 166s performed compared to a shipping 133-MHz Pentium PC. On average, the six Pentium-166s ran about 3 percent slower than a comparable Dell Dimension XPS P133c (a mainstream model we chose for comparison due to its high ratings in our monthly Top 20) and less than 3 percent faster than last month's three P-150s.

Our speed champ, the Maximus P-166, outran the Dell P-133 by just 7.4 percent, while the laggard Digital P-166 trailed the Dell P-133 by more than 18 percent. Even Dell's own P-166 showed only a 3 percent improvement over the company's P-133. More than anything, these results demonstrate the performance gap between early machines and well-established products.

The new 166-MHz systems didn't fare much better running *PC World*'s Windows 3.1–based applications benchmark tests. The Micron P-166 rating virtually tied an



Breaking News

NETTING MICROSOFT: The software giant has jumped big-time onto the Internet bandwagon, announcing plans for a soup-to-nuts line of Net-ready products. A forthcoming Windows 95 add-on will meld features of the Windows 95 Explorer and Microsoft's Internet Explorer Web browser to give users a unified interface for their local PC, office LAN, and the Internet. Enhanced tools for creating Web content are also on the way: Microsoft will finally release an HTML authoring tool, called Internet Studio (formerly code-named Blackbird), and will license Sun's Java technology for writing Web applets; future versions of the Office applications suite will include wizards for making Web pages directly from the apps. At the server end, Microsoft plans to integrate its new Internet Information Server directly into Windows NT, making NT an all-in-one tool for budding Web mavens; Internet Information Server includes Web, FTP, and Gopher server software. Finally, the company is repositioning the Microsoft Network as an Internet service gateway, à la America Online's GNN. These technologies aren't new, and many of the announced products are still vaporware. But Microsoft's sweeping announcement underscores its need to catch up with Internet competitors such as Netscape and Sun—and its willingness to embrace industry standards when it can't enforce its own. —D. M.

(continued on page 47)

PHOTO: JOHN GREENLEIGH; ILLUSTRATION: JEFFREY PELO

average score for comparably configured Pentium-133s, while the Maximus P-166 ran the Windows 3.1 tests about 12 percent faster than did 133-MHz Pentium PCs. (This system had 32MB of RAM in the Windows 3.1 tests, but past results indicate that RAM configurations above 8MB don't materially affect our Windows 3.1 test scores.) We expect Windows 3.1 results for the other four P-166s to be comparable to those we found under Windows 95.

Power Configurations

As top-of-the-line PCs, the new 166-MHz machines are richly configured. All the systems we looked at came with 16MB or 32MB of RAM, 256K or larger secondary caches, quad-speed or faster CD-ROM drives, 1GB or larger hard drives, advanced video boards, and Windows 95 preinstalled.

The $3879 Dell Dimension XPS P166c that we tested had 16MB of RAM (the 32MB model sells for $4479), a 512K secondary cache, a 128-bit Number Nine Imagine graphics board with 4MB of VRAM, a 6X CD-ROM drive, a 28.8-kbps U.S. Robotics Sportster fax-modem, and a Sound Blaster AWE32 wavetable sound card. However, the Dell's 1GB IDE drive was among the smallest in the group. (The 133-MHz Dell system we used for our performance comparison sells for $3579.)

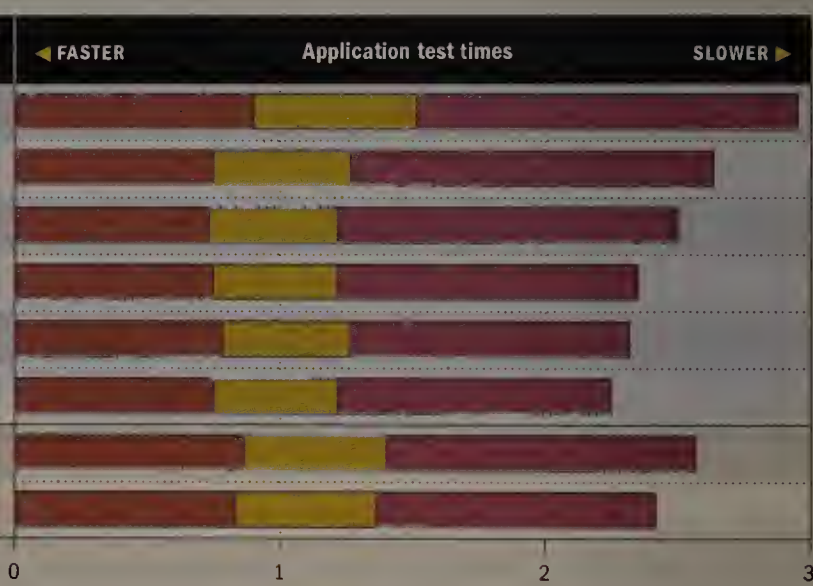
The Maximus Magna Office was configured nearly identically, except that the cache was only 256K and the CD-ROM drive was quad-speed. Considering its chart-topping performance and $3695 price for a 16MB model, this system looks to be one of the best P-166 deals now available. (The 32MB model sells for $4195.)

The Digital Celebris GL-ST sported a more conventional 16MB of RAM and a 256K secondary cache—the same configuration as the Gateway 2000 P5-166 XL and the Micron P166 Millennia Plus. The Digital and Gateway systems also had in common the same 1.6GB Western Digital hard drive. The Digital's standout elements

TEST REPORT

Early Pentium-166 PCs Running Windows 95 Show Mixed Results

System	CPU/bus speed (MHz)	RAM (MB)	Secondary cache (K)
Digital Celebris GL-ST	Pentium-166/66	16	256
Gateway 2000 P5-166 XL	Pentium-166/66	16	256
Tangent MediaStar 5166/95	Pentium-166/66	16	512
Dell Dimension XPS P166c	Pentium-166/66	16	512
Micron P166 Millennia Plus	Pentium-166/66	16	256
Maximus Magna Office	Pentium-166/66	16	256
Average of three Pentium-150s[1]	Pentium-150/60	16	256
Dell Dimension XPS P133c	Pentium-133/66	16	256

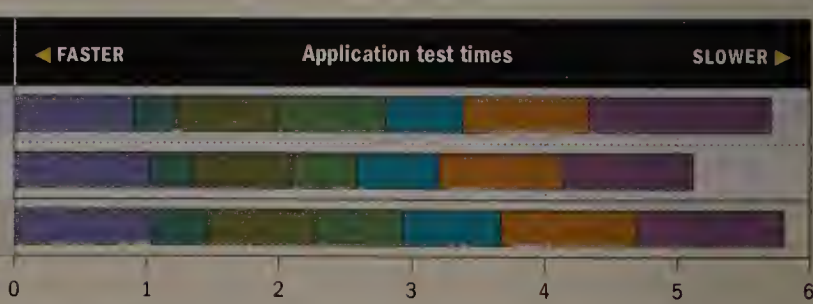


[1] Preproduction systems.

Word 95 · Excel 95 · Picture Publisher 6.0 for Windows 95

Performance on Windows 3.1 Is Also Ho-Hum

System	CPU/bus speed (MHz)	RAM (MB)	Secondary cache (K)
Micron P166 Millennia Plus	Pentium-166/66	16	256
Maximus Magna Office	Pentium-166/66	32	256
Average of 17 Pentium-133s	Pentium-133/66	16	256



1-2-3 release 3.4 for DOS · Excel 4.0 · Freelance 1.0 for Windows · Paradox 3.5 for DOS · Paradox 1.0 for Windows · Word 2.0 for Windows · WordPerfect 6.0 for DOS

Methodology
For Windows 95 tests, we used the vendor's version of the operating system and used default installations for all test applications. For descriptions of the Word, Excel, and Picture Publisher tests, see "Is Windows 95 Faster?...Take 2," Top of the News, November 1995. The Windows 3.1 tests used the standard PC World benchmark suite.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Dell Dimension XPS P166c

Dell Computer, 800/289-3355
Pricing: $3879
Reader service no. 786

Digital Celebris GL-ST

Digital Equipment Corp., 800/722-9332
Pricing: $4528
Reader service no. 787

Gateway 2000 P5-166 XL

Gateway 2000, 800/846-2000
Pricing: $3799
Reader service no. 788

Maximus Magna Office

Maximus, 800/888-6294
Pricing: $3695
Reader service no. 789

Micron P166 Millennia Plus

Micron, 800/223-6571
Pricing: $4446
Reader service no. 790

Tangent MediaStar 5166/95

Tangent, 800/974-6658
Pricing: $3295
Reader service no. 791

were a built-in ethernet port and a microphone. It also used 2MB of the somewhat unusual Windows RAM (WRAM) on its Matrox MGA graphics adapter. As tested, the Digital cost $4528; due to its poky performance and high cost, it had the worst price/performance ratio of the bunch.

The Gateway 2000 P5-166 XL, second to last in performance, had no standout features except a Matrox Millennium graphics adapter with 2MB of WRAM. Its $3799 price includes a 28.8-kbps U.S. Robotics fax-modem. The Micron, on the other hand, was runner-up in the speed race. The $4446 system we tested had a 2.15GB SCSI hard drive and a 1GB Iomega Jaz removable cartridge drive. Without the Jaz and with a 1.2GB IDE hard drive instead of the SCSI device, it goes for only $3148, making it the least expensive of the pack.

The Tangent MediaStar 5166/95, in the middle of the performance pack, came with 16MB of RAM, a 512K secondary cache, a 1GB hard drive, an STB PowerGraphics 64 board with 2MB of EDO RAM, a quad-speed CD-ROM drive, and a Creative Labs Vibra 16 sound card. At $3295, it's aggressively priced. Ironically, Tangent's 133-MHz PC remains the fastest Pentium system we've measured; we'll have to see if the company's P-166 grabs that title when the machine is tuned up.

Recipes for Success

Industry sources say 90- and 100-MHz systems are rapidly migrating to the low end, while 120- and 133-MHz systems are becoming mass-market mainstream products faster than expected. The next great shift will be to 150- and 166-MHz systems, which should be in ample supply by the time you read this. According to one source, the Pentium-166 may become the next market "sweet spot," as standard-setting and long-lived as Intel's 486DX2-66.

Not all vendors are writing off the Pentium-150. "It all depends on the price point," says Raymond Jones, senior marketing manager for Micron. "Initially I'd expect the Pentium-150s to sell really well and then only gradually have the Pentium-166s take over." Micron's P-150 will sell for $200 less than a comparable P-166.

For the majority of business and home users, 166 MHz will be more than enough speed for years to come. Although rumors of a 180-MHz Pentium continue to surface, Intel won't comment. Given that this would have to be a clock-tripled chip running on a 60-MHz bus—versus the faster 66-MHz bus used in P-100, P-133, and P-166 systems—the extra 8 percent or so speed increase may not be worth the price.

Our advice for now: Keep your eye on the Pentium-166, but hold off a bit on purchasing one. In a few months, when vendors have tweaked their BIOSs and optimized their chip sets, we fully expect these powerhouse systems to become the hottest tomatoes around.

—Owen Linderholm and Andy Reinhardt

Breaking News

(continued from page 45)

SET-TOP BOX REDUX? The computer industry is abuzz with talk of new ultralow-cost systems. Several big-name vendors, including IBM, Oracle, Sun, and Wyse, are expected to offer stripped-down basic devices costing $500 and under. These products will rely on an Internet or LAN server to supplement their limited local storage and computing power.

The Consumer Model: **This summer, Oracle plans to offer a $500 box dubbed the Internet PC, says Andy Laursen, Oracle's VP of network computing. The device will sport 4MB of RAM, a low-power microprocessor (probably an ARM [Advanced RISC Machines] chip), and an undisclosed operating system. It will hook up to the Internet via a high-speed link, either ISDN digital phone service or connections offered by cable TV companies. Even cheaper products could follow by early 1997, according to Mark Winther, analyst at International Data Corporation. LSI Logic is currently offering low-cost, custom-built microprocessors for Internet devices; hardware vendors could use these chips to make an Internet PC that uses a TV as its monitor and lists for $200 to $300. Who's going to sell these machines? Consumer product companies such as Sony, as well as telephone and cable companies, Winther says.**

The Corporate Model: **For corporate customers who need inexpensive access to a LAN, Wyse Technologies is**

(continued on page 49)

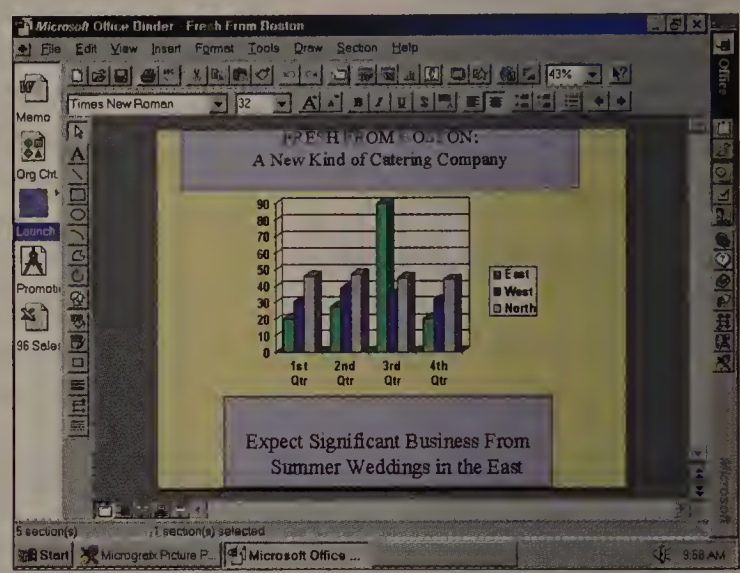
JEFFREY PELO

Office Binder: Docs in a Box

Until now, when you worked in Windows on a complex report, you had to manage all the pieces yourself. OLE (Object Linking and Embedding) allowed you to combine related material—spreadsheets, word processing documents, and graphics—into a single file. But when you forwarded the report to a colleague, you had to remember to include the linked files.

The Office Binder feature in Office 95 takes a new approach. After creating documents with Excel, PowerPoint, Word, or third-party Binder-compatible apps, you can combine them into a single file. Then you can e-mail the whole Binder, or even print it as one long document with consecutive page numbers. To support teams of people sharing files on a LAN, the Binder also tracks revisions by author and date.

If you've installed Microsoft Office 95, Binder appears as a choice in your list of programs. With a Binder file open, icons on the left side of the screen identify each document and the application that created it. Using these icons, you can jump from one document to another without manually launching a new app or hunting for a file.



BINDER REVEALED: Icons on the left represent the Binder's contents; select one to launch the associated application.

Binder Compatibility

At press time, eight third-party packages supported the Binder compound-document specification—with more on the way. Many companies did not have time to work Binder support into their first Windows 95 products; expect more support in later revisions, predicts Jeffrey Tarter, editor of *Soft-letter*.

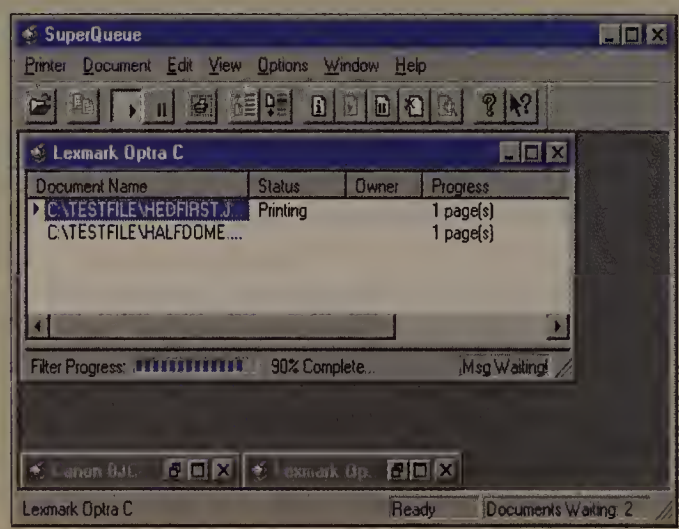
Just because a program is labeled Office 95 compatible doesn't mean it supports the Binder. Developers need special programming tools from Microsoft to create Binder-compatible apps. Many of the first Binder programs come from powerhouse graphics companies (not surprising, since graphics naturally complement long documents): 3D/Eye's TriSpectives and TriSpectives

Boost Output With SuperPrint:

Zenographics' SuperPrint 4.0 print spooler offers slick graphics capabilities currently unavailable in Windows 95 and speeds up printing of complex documents by taking advantage of multitasking. The program has a street price under $50, and it comes on a single CD-ROM that also contains versions for Windows 3.1 and Windows NT.

SuperPrint accelerates printing on stand-alone and networked printers in two ways: First, without loss of quality, the product compresses pages for faster transmission over data lines. Second, it substitutes faster, more efficient 32-bit code for some 16-bit code in Windows 95 that can slow down printing. We noticed the greatest advantage when printing complex files: In informal tests under Windows 95, a two-page Word document containing multiple fonts, formats, and bit-mapped graphics printed 60 percent faster on a stand-alone printer once we installed SuperPrint. However, we saw little speed difference printing plain-text documents.

We were also impressed with SuperPrint's 32-bit multitasking support, which lets you use other programs while you're printing without slowdowns or jerky cursor movement. The SuperQueue window (shown here) lets you view, pause, delete, and reorder print jobs.



SuperPrint ships with a wide variety of 32-bit SuperDrivers for most leading printers and includes a software PostScript Level II interpreter. Our only beef: We would like to be able to print simply by dragging files to the SuperPrint icon on the desktop instead of having to open up the app. Zenographics; 800/366-7494.

Reader service no. 792

—Bill Underwood

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Professional; Micrografx's Designer 6.0 and Picture Publisher 6.0 (part of the company's ABC Graphics Suite); Visio's Visio 4.0 and Visio Technical 4.0; and Corel's Corel Flow 3. Corel also plans Binder support in Corel Ventura 6, scheduled to ship in the second quarter of 1996, and Corel Draw 7, which had no ship date at press time.

Pluses and Minuses

Binder's biggest drawback is the limited number of applications that support it. Neither of the other big application suites—Lotus SmartSuite 96 and Novell's upcoming PerfectOffice—uses Binder or offers a precise equivalent to it. (Lotus Word Pro does let you link external files to Word Pro documents via OLE, but you can't print the files as one consecutive document.) Some big vendors, like Adobe and Claris, haven't yet decided whether to implement Binder compatibility. And Apple and IBM are pushing a different approach in OpenDoc, their alternative to OLE. OpenDoc is just starting to appear, so it hasn't had time to prove itself with customers.

The Next Step

Binder may be a harbinger of the way we use software in the future. Today, when you need to do a job such as retouching a photo, you have to buy an entire application loaded with features you may never use. Imagine if instead you could buy small, inexpensive applets that perform a particular task, integrate with other software, and run on any platform. If pundits are right, you may be buying this kind of software within two years.

Where are you going to store all the documents created with these applets? You need an *object container*, and if Microsoft has its way, that container will be something like the Binder. The next major release of Windows NT, in fact, will reportedly include a storehouse for objects.

In the meantime, you can use the Office Binder to organize projects. It's not perfect, mostly because some of your favorite applications won't support it, but for Office 95 fans, the Binder's a useful way to get a handle on long documents.

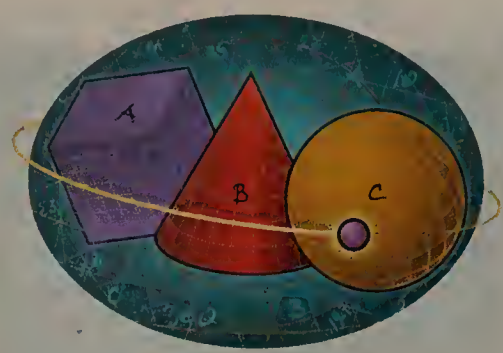
—Laurianne McLaughlin

Count Me In: The First Binder-Compatible Apps Not From Microsoft

Company	Product	Use	Shipping	List price
3D/Eye 800/946-9533	TriSpectives	3-D graphics	now	$299.95
	TriSpectives Professional	3-D graphics diagramming	now	$499.95
AlphaBlox 617/229-2924	OfficeBlox 2.0	add-in templates for Office 95 programs	Q1 1996	$69
Arcland 800/315-8921	FlowModel 2.0	flowcharting	Q2 1996	$195
Corel 800/772-6735	Corel Flow 3	flowcharting	now	$199, upgrade $79
	Corel Ventura 6	desktop publishing	Q2 1996	n/a, version 5 $495
	CorelDraw 7	graphics	n/a	n/a, version 6 $695
Kurzweil Applied Intelligence 800/380-1234	Kurzweil Voice for Windows 2.0	voice recognition	Q1 1996	$995
Micrografx 800/676-3110	Designer 6.0 and Picture Publisher 6.0	graphics, image editing	now	$299, competitive upgrade $149
Numera Software 206/622-2233	Visual CADD 2.1	CAD	n/a	n/a, version 2.0 $595
PC Docs 617/273-3800	Docs Open 3.0	document management	now	$349 per client, $795 per server
SoftKey 617/494-1200	Calendar Creator for Windows 95	calendar design	now	$59.95
Visio 800/248-4746	Visio 4.0	flowcharting, diagramming	now	$249
	Visio Technical 4.0	technical drawing	now	$399

n/a = not available

JEFFREY PELO



Breaking News

(continued from page 47)

shipping the Winterm 2000, a $500 monochrome terminal; and the Winterm 2500, a $750 color model. These machines—reminiscent of the X terminals popular in the UNIX world—run Windows software remotely from a Windows NT network server with a customized version of Citrix's WinFrame server software. IBM also plans to sell so-called InterPersonal Computers—PCs without hard drives—to corporate customers on a limited basis, as early as the first quarter of 1996. Is this back to the future? —L. M.

FASTER PRINTING, LOWER PRICE: If you've been waiting to buy a 600-dpi personal laser printer, your patience has paid off: New models offer 8-page-per-minute performance at 6-ppm prices. This month Samsung plans to ship the QwikLaser model QL85G, a Windows printer with 512K of RAM, for a street price of $499. A similar Samsung model with added PCL 5e emulation and 2MB of RAM will sell for $649. Xerox plans this month to offer the DocuPrint 4508, a 600-dpi personal laser with PCL5e emulation and 2MB of RAM, for a street price of $695. While Hewlett-Packard isn't expected to cut prices in response, vendors such as Brother and Okidata may choose to reduce prices on 4-ppm and 6-ppm laser models slightly—to the $350-to-$450 price range, says Larry Jamieson, senior industry analyst at Giga Information Group. —L. M.

Edited by Randy Ross

Windows 95 Update: Bug Fixes and a Bit More

Yes, Windows 95 has bugs. But Microsoft is in no great hurry to release an upgrade to the operating system. Instead, it plans to supply a package of minor updates and bug fixes, probably sometime in the first quarter of this year.

Product Manager Rob Bennett says the upcoming Service Pack for Windows 95 is mainly a bundle of free patches and add-ins that Microsoft has already posted online. The company won't release the no-cost Service Pack until the available updates reach "critical mass," Bennett says; the benefit will be the convenience of having all the Win 95 updates together on a set of floppy disks. Bennett emphasizes that the Service Pack won't contain new Windows 95 features or code.

Enhancements and fixes already available online include patches that plug security holes in file and printer sharing (see January *Bug Watch*), a client for NetWare Directory Services that lets users more easily log into and browse NetWare servers, a minor update to the Windows 95 shell that unsnarls printer-browsing snafus with NDS client software, new protocol stacks for accessing IBM mainframes and minicomputers, and support for infrared connections. Fixes for Binary File Transfer and cover page glitches in Exchange Fax were also in the works but not available online as we went to press.

Looking for a Few New Goodies

The update will likely offer a few extras that fall outside of Windows 95 itself; Microsoft hadn't decided what to include at press time. One intriguing possibility is a CD-ROM version of the Service Pack. Given how little space the software fixes occupy, the disc's ample capacity could be filled up with driver updates or freebies like release 2.0 of Microsoft's Internet Explorer Web browser.

Bennett says a few anticipated capabilities definitely won't be included in the Service Pack. For instance, Microsoft's new 3-D and DirectX display and multimedia subsystems won't be there, even though they've been available to software developers for months. Instead, applicable DirectX and 3-D drivers will be bundled with programs that use them, such as the forthcoming Windows 95 version of Doom, Bennett says. However, both DirectX and 3-D driver support will be integrated into the next release of Windows—whenever that arrives.

—Scott Spanbauer

Bug Watch Toshiba Portables Spar With Win 95; Excel 95 Bugs and Fixes

Many Toshiba Laptops Unhappy With Windows 95

▶ Bug: Upgrading many models of Toshiba laptops to Windows 95 causes the computer's bundled utilities Maxtime, FN-esse, and Audio Control Windows Sound System to function improperly. The problems occur with Toshiba T610, T400 series, T4900CT, T4800 series, T4700 series, T3600 series, T2400 series, and T2100 series systems that have BIOS versions earlier than 5.0. In addition, users of T400 series and T610 models report that the systems running Windows 95 do not resume properly after being placed in suspend mode.

▶ Fix: If you plan on installing Windows 95 (or already have installed it) on one of the affected computers, Toshiba strongly recommends that you upgrade the computer's flash BIOS to version 5.0 or later. If Windows 95 has already been installed when you upgrade the BIOS, you may have to reinstall it, the company says. The BIOS upgrade solves the suspend mode problem, enables automatic switching in Windows 95 between internal and external displays when warm docking with a port replicator or DeskStation, and includes an updated hotkey.DLL file that fixes problems with the utility programs. You can download the BIOS upgrade from Toshiba's Web page (http://www.toshiba.com/tais/csd/support/products/win95/flash95.htm), BBS (714/837-4408), or CompuServe forum (go toshiba).

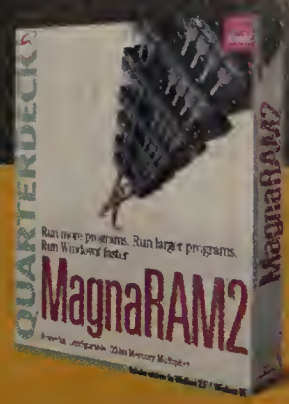
Excel Bugs: Everyday and Esoteric

▶ Bug: Two serious bugs have popped up in Microsoft Excel for Windows 95 (Excel 7.0). The first prevents links between certain cells in different worksheets from updating properly. The second causes crashes when you copy a range containing a reference and then use the Transpose option in the Edit • Paste Special dialog box to reverse rows and columns. Another Excel problem may interest you if you followed last year's Pentium bug uproar: In all versions of Excel dating back to 3.0, three specific 15-digit number sequences can display incorrectly on worksheets. The sequences are 140737488355328, 281474976710656, and 562949953421312. Numbers may or may not appear wrong depending on where the decimal point is: Entering 1.40737488355328 into a cell causes Excel to display 0.64, whereas 140.737488355328 displays correctly.

Fix: Microsoft has fixes for the Excel 7.0 bugs and a patch to correct the 15-digit display problem in Excel 5.0c and 7.0. (Patches for earlier versions are still to come.) You can download self-extracting archives of Excel 5.0c (we1254.exe) and 7.0 (xl15link.exe) patches from Microsoft's Web page (http://www.microsoft.com/msexcel), or from Microsoft Network and CompuServe Excel forums (go msexcel). To get the patches on disk, call Microsoft at 800/360-7561. The Excel 95 fix automatically corrects linking errors. **—Scott Spanbauer**

JEFFREY PELO

QUARTERDECK



Now that MagnaRAM's around, you'll be seeing a lot fewer "RAM doublers" in the neighborhood. How can they possibly compete against the 32-bit memory multiplying power of MagnaRAM?

MagnaRAM doesn't double. It multiplies. It takes your physical memory and compresses it until you have maximum memory. And it combines this ultra-safe compression technology with a proprietary method for improving virtual memory speed.

It's a good combination because it means you have more usable memory for Windows® 95 and Windows 3.1. You can open more and bigger programs without getting that annoying little "out of memory" box. And because you don't go to the disk as often, the programs run much faster.

The proof is charted on a simple, graphical screen. If you want to see how much your system's memory and performance has improved, you can easily find out.

If you want to fine-tune speed and memory, you can do that, too. MagnaRAM is fully configurable.

It's all very simple. There are no chips to install, no technicians to pay. You can install it in seconds, and it runs in the background.

Best of all, MagnaRAM costs a lot less than you'd pay for RAM chips or SIMM modules.*

To find out more, see your retailer, visit our website at www.qdeck.com, or give us a call at 1-800-683-6696.

(No cute little puppies were harmed in the making of this ad.)

Circle 190 on reader service card

*Test was performed using an HP Vectra 486s/33XM, 16 MB RAM running Windows 3.1, Solitaire, Microsoft Works, Lotus 1-2-3, MS-DOS, Shoot Video Light, Corel Draw 5.0, Adobe Photoshop, VidGrid, and Corel Chart. Test conducted with products available at the time.

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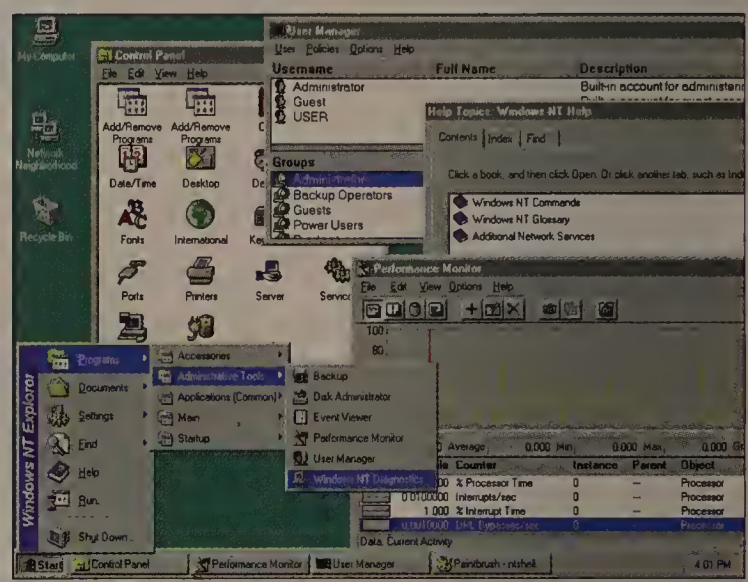
Windows NT Gets a 95-ish Look

Windows NT is getting a face-lift. A new user interface for NT that resembles Windows 95's is now undergoing extended beta testing. But while the updated look improves the operating system's usability, the allure is only skin deep. For good and for bad, beneath the surface Windows NT remains largely the same.

The Shell Technology Preview we examined is like a stripped-down version of the Windows 95 desktop, with three familiar icons (My Computer, Network Neighborhood, and Recycle Bin), and a Taskbar at the bottom. The shell inherits many attributes of Windows 95—for instance, full drag and drop, tabbed dialogs, and right-mouse-button pop-up menus. But it also lacks some of the capabilities central to Windows 95. Click the Start button, and you'll see 'Windows NT Explorer' painted brightly up the side of the menu; unfortunately, Windows NT doesn't actually *include* a version of the Explorer file manager. Instead, the Programs menu leads you back to the clunky Windows 3.*x*–style File Manager. The 3.51 version of NT that we used also didn't include support for the Microsoft Telephony API (TAPI), so Windows 95 features such as the universal in-box and The Microsoft Network client didn't appear on the desktop.

Halfway Help

The beta shell has some other limitations. Below the top-level menus, many NT dialogs retain their 3.*x*-like appearance. You can't access printers from the Settings menu and must instead return to the Control Panel. And none of the nifty Wizards familiar to Windows 95 users are available. Still, the addition of basic Win 95 design elements gives NT an interface with a much broader appeal than the now old-fashioned Windows 3.*x* look.



SPITTIN' IMAGE: A new shell makes Microsoft's Windows NT look like Windows 95, but inside they remain quite different.

Megan Bliss, group product manager for Windows NT Workstation at Microsoft, says the next beta release of the new Windows NT shell is expected in the first quarter of 1996. This upgrade will also include TAPI and the Unimodem universal modem driver, Bliss says, but won't add support for Plug and Play, power management, or Network OLE. These features, plus a fully integrated Win 95–type shell, are expected in the next major version of NT, code-named Cairo and slated for release in late 1996. Microsoft says that NT and Windows 95 will eventually converge on an identical interface, though they will not share a single code base.

—Susan Silvius

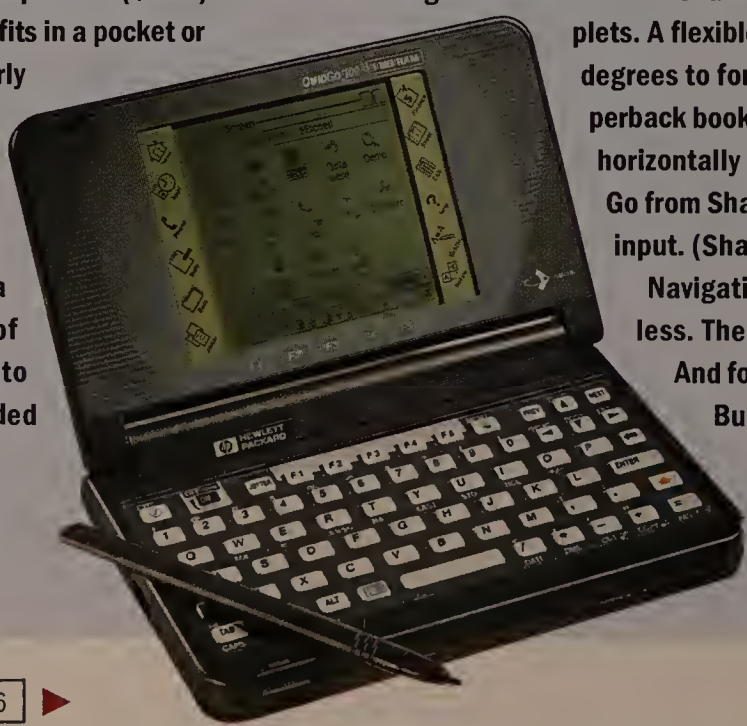
HP OmniGo: A PDA You Can Use

If you need a pocket organizer that can handle lists, addresses, and finances while you're away from the office, HP's new OmniGo 100 merits a look. This relatively inexpensive ($349) device is a bit larger than a checkbook and fits in a pocket or purse. I was particularly impressed with the software: The OmniGo comes with the slick Geoworks Geos operating system and a sensible collection of applets that are easy to use with the included pen. My only beef: I couldn't master Palm Computing's Graffiti handwriting recognition software, which comes with the OmniGo.

The OmniGo offers a telephone and address book, an appointment scheduler, and very basic spreadsheet and database applets. A flexible case hinge lets the screen fold open almost 360 degrees to form an easy-to-hold package about the size of a paperback book. Screen orientation rotates so you can work either horizontally or vertically. These features distinguish the OmniGo from Sharp's competing Wizards, which do not support pen input. (Sharp's $369.99 Wizard OZ-5600, though, is backlit.)

Navigating the interface with the pen was virtually effortless. The OmniGo stored my scratchings as an image file. And for longer text entries, I typed on the built-in keypad. But to my considerable frustration, the Graffiti software would not recognize my handwriting, even after many attempts. Hewlett-Packard; 800/443-1254. Reader service no. 785

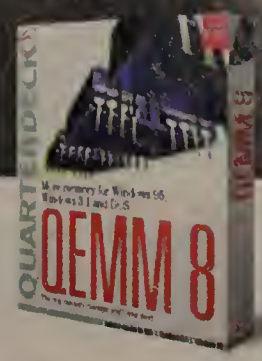
—Gabrielle Mitchell



The HP OmniGo 100's Geos pen interface makes staying organized easy.

JOHN GREENLEIGH

QUARTERDECK



INTRODUCING QEMM® 8.
MORE MEMORY, MORE MEMORY, AND STILL MORE MEMORY
FOR WINDOWS 95, WINDOWS 3.1 AND DOS.

AMAZING NEW TECHNOLOGY

The world's best-selling memory management program is now bigger than ever.

Quarterdeck's QEMM 8 breaks through barriers to squeeze every last byte of memory out of your computer. With a program that's generations ahead in technology, safety and ease of use. And comprehensive enough to let you run all the applications you need, from 32-bit Windows 95 all the way back to DOS.

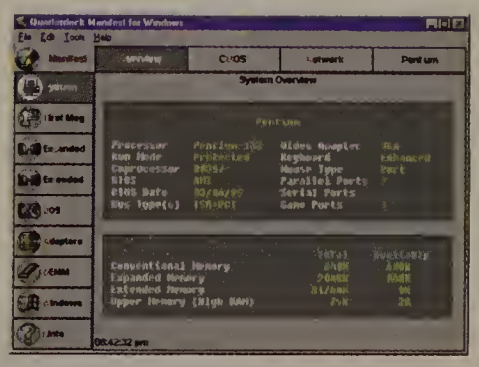
QEMM 8 uses three key technologies:

QEMM's memory multiplying technology is a proprietary method that compresses physical memory. This, combined with a unique technique to speed up virtual memory gives you maximum available Windows memory. So you don't need to fork out hundreds of dollars for expensive RAM chips.

Just point and click to optimize your PC.

QEMM's resource manager frees up Windows 3.1 User and GDI resources. So you can open more programs simultaneously without those dreaded 'Out Of Memory' messages.

QEMM's system memory management squeezes up to 634K out of the 640K, with patented Stealth technology that maps system ROM into other areas of memory. This doesn't just make your programs and games under the DOS prompt scream right off your screen, it gets Windows the memory it needs.



Manifest gives you a 'view under the hood' of your PC.

No other memory program does so much.

Or does it so well. All this power comes to you in a package that's incredibly easy to set up, optimizes your PC automatically and lets power users fine-tune the settings.

QEMM 8 also comes with Manifest®, so you can see what's happening with your memory and other system components like PCMCIA adapters.

Not that you'll ever have anything to worry about. Over 10 years of experience in memory management makes QEMM 8 one of the most dependable programs.

You couldn't do more for your computer than visit your local dealer today. For more information, go to www.quarterdeck.com or call 1-800-683-6696.

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Old PCs: It Pays to Trade

If the arrival of Windows 95 has rendered your PC —or hundreds of PCs in your company—obsolete, you're facing the cost and hassle of getting rid of old equipment. Turns out, lots of other people are in the same boat, and a variety of new services are popping up to help.

Surprise! It costs a bundle to dispose of a PC, even if all you do is give it away. Transferring and deleting software and data, temporary storage, and packing and shipping can add up to between $400 and $600 per PC, according to research from the Gartner Group in Stamford, Connecticut.

SELLING PCS TO EMPLOYEES benefits all, says Semiconductor Systems' Bob Miller.

If you're hoping to harvest some of the value remaining in your PCs, you have a growing number of options. You can donate used systems to charitable organizations, helping them out while getting a tax break for yourself or your business. (For more on donating PCs, see *Real Problems, Real Solutions*, September 1995.) Or you can sell your equipment through classified ads in your local paper or on the Internet.

Virtual Swap Meet

One method of jettisoning PCs is to hawk them through used-computer exchanges—virtual swap meets that broker computers among sellers and buyers. But the newest trend is trade-ins sponsored by computer vendors. Taking their cue from auto sellers, a growing number of PC makers now let you return old systems for credit toward new ones. Working 486s, for instance, can yield between 15 and 40 percent of their original price.

How much cash or credit you get depends on several factors: how many systems are involved, their age and condition, and whether you do the dirty work yourself or ask somebody else to handle it for you. Computer exchanges typically yield the most payoff per PC, but you have to prepare and ship the equipment yourself—and it has to work. Vendor-sponsored trade-ins pay a bit less, but some firms will come into your office and collect the equipment, saving you hundreds of dollars per machine in labor costs. Certain companies even accept non-working systems. But as stipulations abound, do ask a lot of questions.

Trading in makes sense if you have more than a handful of systems to get rid of and aren't sure they all work, says Joe Pucciarelli, a Gartner Group research director who specializes in computer asset management.

Hewlett-Packard's new Client Server Trade-Up Program is a good choice if you want new HP systems. The program lets you trade in used PCs made by any manufacturer, even if they don't work, for HP Vectra PCs or HP NetServers. At press time, a 33-MHz 486 Dell machine with 4MB of RAM and a 240MB hard drive was worth about $325 in credit toward a new HP system.

You have to buy at least five new PCs to participate in HP's program, and you can't trade in more than you buy in terms of dollar value. HP will also come to your premises and cart away your old equipment, but you'll get about $75 more per system if you ship the units yourself.

Similarly, Dell's Integrated Technology Transition Program takes trade-ins if you want new Dells. Like HP, Dell will come to your site and take your old PCs off the desk, regardless of their brand or condition. Trading in a system like the 486 described above will knock about $225 off the price of a new machine.

Unlike HP, Dell doesn't require a minimum order. In fact, you don't even have to buy Dell PCs—but then you won't get credit, and you'll be charged a removal fee of $10 per machine. So why bother? To avoid the expense and hassle of junking the systems yourself.

Trade-In Specialists

IBM runs its PC Trade-In Program through Boston-based IBC Ltd. To participate, you must dispose of at least 20 PCs. If you don't buy new machines from IBM, you get cash. In either case, you pay for shipping the old systems. The PCs you sell must be 386SX-class or better and in good working condition. (However, the company will also take even older PCs off your hands as long as you're selling IBC enough systems. Check for details.)

LEFT: ROBERT HOLMGREN; ABOVE: JOHN KUCZALA

QUARTERDECK

Quarterdeck CleanSweep™ 95 is the first 32-bit uninstaller for all versions of Windows. We also believe it's the only uninstaller worth looking at, period. But you don't have to take our word for it. "When you delete files, CleanSweep bundles them into a package, compresses them, and archives them where it can find them again... this looks to be... one of the 'must have' Windows '95 supplementary programs." JERRY POURNELLE, BYTE, NOV 95 "CleanSweep 95's user interface is still the simplest and most intuitive of all the commercial uninstallers PC Week Labs has seen... CleanSweep's system cleanup features were very strong, helping us find duplicated, unused, and orphaned files to remove from our systems." JIM RAPOZA, PC WEEK, NOV 95 "To the rescue comes Quarterdeck's new CleanSweep. When I installed CleanSweep, I had a spindly 5MB left on my 340MB hard disk's C: partition. As I write this I have 33MB. CleanSweep 95... is the janitor who can get you back that accidentally tossed manila folder the next day. It gives you a new lease on disk space with a vow never to let you junk your drive up again." PAUL ANDREWS, SEATTLE TIMES, OCT 95

Circle 225 on reader service card

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Like IBC, Rumarson Technologies is a specialized PC trade-in company. It works mostly with resellers such as MicroAge to dispose of used PCs for their customers. Rumarson also contracts directly with some large organizations to unload used systems but prefers not to deal with individuals or small companies.

Rumarson requires your old PCs to be in good working condition. The company can arrange shipping, though it deducts an amount for this that depends on the number of PCs and your location. Like IBC, Rumarson no longer buys 286-level machines.

Quick Cash: The Used-PC Market

Another way to unload aging PCs is to sell them through a used-computer exchange. This approach works well for individuals and small organizations, says David Rines, research analyst for International Data Corporation in Framingham, Massachusetts. You have to package your PC and arrange for shipping, which is more practical if you're selling 1 system than if you're unloading 10 or 100.

Computer exchanges don't buy from you, but help you find a buyer through ads and listings. Potential buyers call an exchange's toll-free number to request a list of systems currently on the market. Some exchanges also have World Wide Web sites. The nationwide reach of exchanges may give you a better chance of finding a buyer willing to pay fair price than if you went through a local used-computer dealer.

Exchanges collect a fee for their services. The American Computer Exchange, for instance, typically charges sellers a 10 percent commission. Recently, a 33-MHz 486 Dell system with 4MB of RAM and a 240MB hard drive went for $600—almost twice what HP pays for a comparable trade-in.

Warning! Cascading PCs

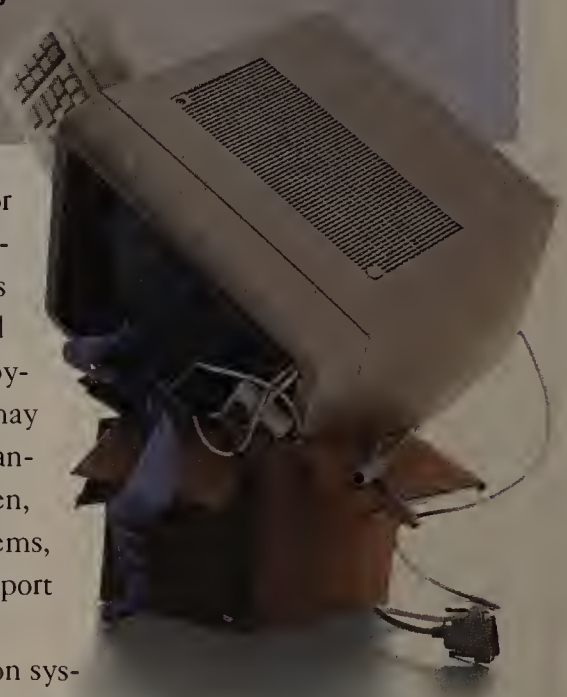
Passing PCs down to employees (known as *cascading*) or selling systems to employees for home use are other common strategies. Both approaches can lead to unanticipated expenses, however. Companies that cascade PCs within their own ranks can spend $350 to $650 per machine in labor costs to transfer the system to a new user, says Gartner's Pucciarelli. And when you sell to employees for home use, you may create an "implied warranty" in their minds; then, when they have problems, they'll ask your tech support staff for help.

Bob Miller, information systems manager for Semiconductor Systems in Fremont, California, solved this problem by enacting an explicit no-support policy. He's sold 30 PCs to employees over the past three years and channels the proceeds into a fund for employee birthday and holiday parties.

—Reid Goldsborough

Spinning Gold From Obsolete PCs

Trade-in programs	Used-computer exchanges
Dell Integrated Technology Transition Program 800/955-3355	**American Computer Exchange** 800/786-0717, 404/250-0050
Hewlett-Packard Client Server Trade-Up Program 800/470-0012	**Boston Computer Exchange** 800/262-6399, 617/542-4414
IBM PC Trade-In Program 617/320-0123	**National Computer Exchange** 800/622-6639, 212/808-3062
Rumarson Technologies 800/929-0029, 908/298-9300	**United Computer Exchange** 800/755-3033, 770/612-1205



The Web Browser Tax Help for Net Navigators

With the help of your trusty PC, this year you can cast off your green eyeshades and do a surprising amount of tax preparation via the Internet. You'll still need forms, of course, which are on the Treasury Department's site in PostScript, PDF, PCL, and SGML formats (at press time, state forms were available only for California, Illinois, Minnesota, Pennsylvania, and Utah): http://www.ustreas.gov/treasury/bureaus/irs/taxforms.html...For a pointer to online tax resources, check out the Income Tax Information in [sic] Internet page, which links to newsgroups, newsletters, and a scattering of articles and journals: http://www2.best.com/~ftmexpat/html/taxsites.html...For a peek into the secret life of CPAs, the Accounting/Tax Software Publishers Site Seeker is a compendium of professional guides and tax shareware gathered by Kent Information Services: http://www.kentis.com/acctxpub.html...If you wait until spring thaw to file, search a Net index for tax preparation for the latest new sites, or hit http://www.intuit.com to see if Intuit's TurboTax site is ready to go. —Richard Overton

California tax lawyer Robert Sommers, aka The Tax Prophet, gives free tax advice via the Web at http://www.taxprophet.com/.

LEFT: JEFFREY PELO; ABOVE: JOHN KUCZALA

You Know
It's A
Great
Performance...

If The Sound Blows You Away...

And if it belts out power performance and sound like no other, then it's gotta be a Gateway 2000® computer! The new Intel® 166MHz Pentium® processor is the fastest Pentium processor available today. And Gateway's high-end P5-166XL professional multimedia system will provide you with extraordinary performance, even for your most robust computing needs. Top it off with Gateway's exclusive Altec™ Lansing ACS-400 speakers, and the P5-166XL ushers you into first-rate stereo sound!

An Encore 166MHz Performance

Bravo! You'll leap to your feet when you experience all the powered-up features of the P5-166XL. This impressive system is built standard with 16MB EDO performance DRAM, 256K pipelined burst cache and 2GB hard drive for unbeatable performance. In fact, we expect our P5-166XL to blow all other Pentium processor-based PCs off the map!

Maestro of Multimedia

Spine-tingling, heart-thumping stereo sound resonates from your Altec Lansing ACS-400 speakers, standard on the P5-166XL and exclusively from Gateway 2000. With an included ACS-250 subwoofer, these speakers give you thunderous bass and extraordinary Dolby® Surround Sound, breathing new life into all your multimedia applications and music CDs! The Ensoniq® Wavetable sound card is also standard on the P5-166XL. You'll be amazed by the ultra-realistic sound of the Ensoniq's wave table synthesis technology.

Could we possibly enhance your multimedia experience more? Yes! Now our P5-166XL, and all Gateway 2000 Family PC™ multimedia systems, also include MPEG (Moving Picture Experts Group) data compression technology. Not only will MPEG technology provide superior stereo sound, it also gives you incomparable full-screen, full-motion video right from your CD-ROM drive. Video from MPEG multimedia applications will be smoother, and soon all your favorite movies will be available on CD! The P5-166XL also includes a super-fast 6X CD-ROM drive for the latest CD-ROM drive technology available.

The P5-166XL adds all these performance features to a Matrox® 2MB WRAM graphics accelerator with MPEG video scaler. So now your 3-D graphics and multimedia applications will run with incredibly smooth video playback.

A Fax/Modem Virtuoso

All your communication needs will be filled with the P5-166XL's included TelePath® 28.8 fax/modem! You may know that Gateway's TelePath fax/modem is state-of-the-art, using the AT command set and including FaxWorks communications, fax and file transfer software package. But there's more. The TelePath fax/modem is also a complete communications tool with its Telephone Answering Device (TAD) for answering machine and voice mail capabilities!

Your TelePath 28.8 fax/modem includes Gateway's Information Highway communications CD, featuring a user-friendly interface and easy-to-use tutorial of included trial memberships to CompuServe®, Prodigy®, America Online® and Reuters Money Network. You'll also receive GNN (Global Network Navigator) for easy access to the Internet.

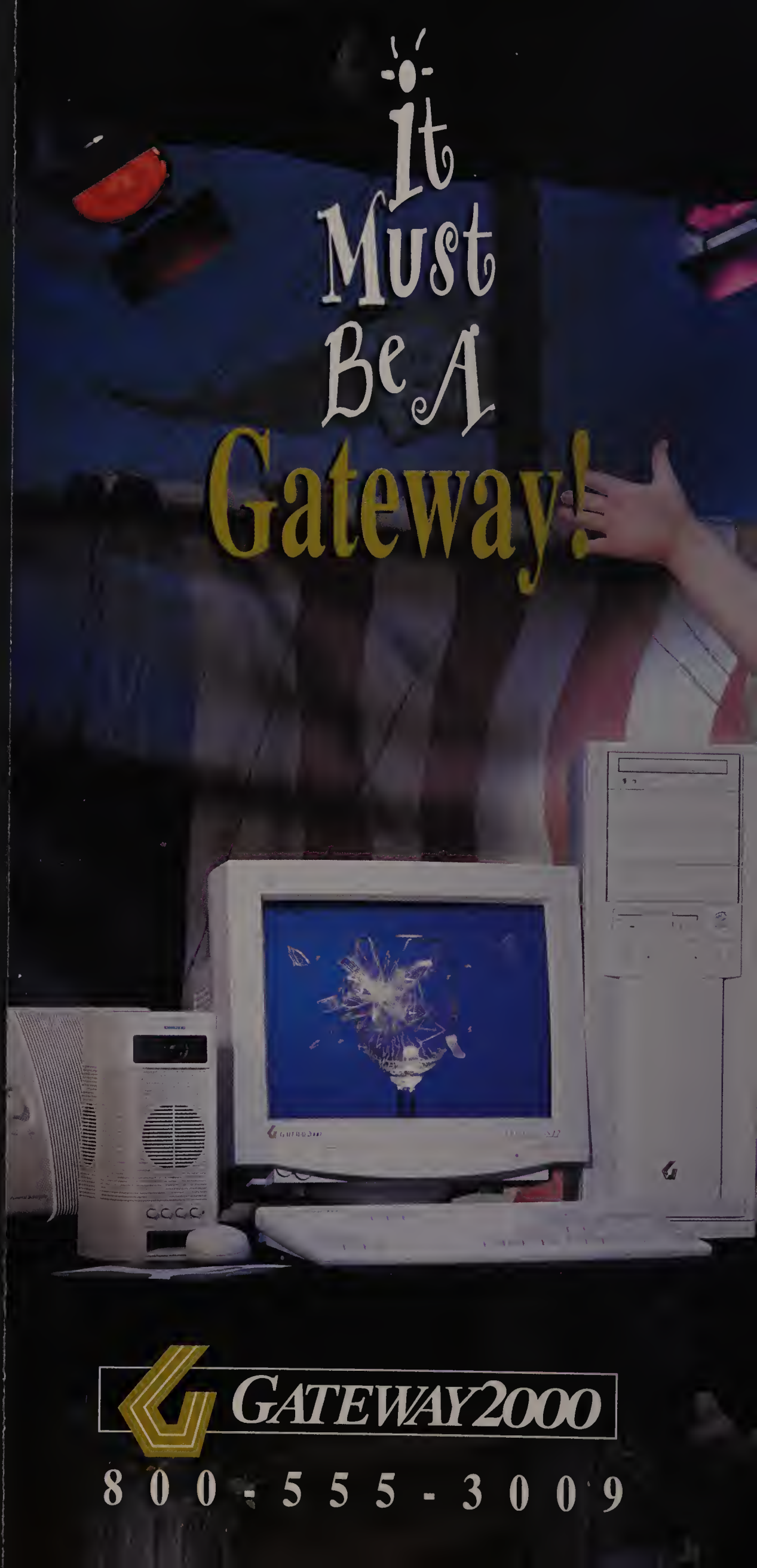
Software Diva

And for the grand finale: The P5-166XL has the *best* software bundle found *anywhere* with Gateway's Ultimate Software Bundle! It includes MS Office 95, Professional Edition and Gateway's Generations II Software Collection for use with the Windows 95 operating system. It's all you'll ever need for business applications in the Windows 95 environment, *and* for the most complete, updated versions of the latest and greatest multimedia applications, most optimized for Windows 95. A gaming pad is included in the Ultimate Software Bundle for use with all your entertainment software. Call and ask how you can upgrade other Gateway 2000 systems to get the Ultimate Software Bundle.

Primo Gateway Gold Premium

All Gateway systems come with our superb Gateway Gold™ service program for unbeatable and award-winning support, including toll-free technical support for the life of your Gateway computer. The P5-166XL gives you even more with Gateway Gold Premium, adding an extended three-year on-site agreement** and a priority 800 number for access to technical experts. Call today and ask for details on our celebrated Gateway Gold programs!

*** Call or write us for a free copy of our on-site service agreement.*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pentium
PROCESSOR

If You *Accomplish* Things You Never Thought Possible...

And if your model for success includes a real brainy computer, then it's just got to be a Gateway! Got a bright idea or two? All Gateway 2000® professional systems are power-packed machines built to handle any mastermind project.

Gateway Professional Systems — An Ingenious Performance

All Gateway professional Pentium® processor-based systems have EDO performance DRAM, and most come standard with pipelined burst cache. These features will give you a faster, more cost-effective means to great performance. And for extraordinary levels of performance, Gateway's P5-133 Professional system includes the ultra-fast 133MHz Pentium processor and is standard with 16MB EDO performance DRAM and 256K pipelined burst cache. Gateway utilizes EDO and pipelined burst cache memory technologies for the best performance — *anywhere*.

All your heavy-duty business applications will run at top speed with the industry's latest 6X CD-ROM drive, standard on the P5-133. This CD-ROM drive performs 50% faster than a 4X CD-ROM, and with 6X technology you'll be ready for tomorrow's complex software applications. Renowned for unconventional wisdom when it comes to value, Gateway 2000 brings you the P5-133 Professional system for just $2,949!

The Right Equation

Gateway PCs include the Microsoft® Windows® 95 operating system, and our Professional models all tout MS Office 95, Professional Edition or MS Works 95, both compatible with 32-bit performance and backward compatibility for 16-bit applications. When you buy a system from Gateway, we'll also give you a choice of operating systems. Whether it's MS-DOS® and Windows for Workgroups, Windows NT, or Windows 95, Gateway 2000 will meet all your computing needs.

Industry-Wide, Prize-Winning Service and Support!

It's a proven theory. Noble and friendly Gateway 2000 employees provide our customers with the best possible service and support in the PC industry. When surveyed, *Computer Shopper*® readers answered "Gateway 2000!" unequivocably and bestowed us with *Computer Shopper's* 1995 Best Overall Hardware Service and Support award.

Presenting the Best Performance in the Industry!

For the fifth consecutive year Gateway 2000 swept the *Computer Shopper* Best Buy awards! We're proud to announce that *Computer Shopper* readers awarded us with these coveted *Computer Shopper* awards: Best 486 Desktop (486DX2-66), Best Pentium Desktop (P5-133XL), Best Multimedia PC (P5-120 Family PC multimedia system), and Best Overall Computer Systems Supplier!!

It's All Relative

Call today and ask about Gateway's Professional computers. They're the only logical solution to your demanding business and professional computing needs! And we'll custom build any computer to fit your exact specifications.

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MERCURY
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EARTH
JUPITER
SATURN
intel inside
pentium
PROCESSOR

NEPTUNE
MERCURY
VENUS
JUPITER
SATURN
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pentium
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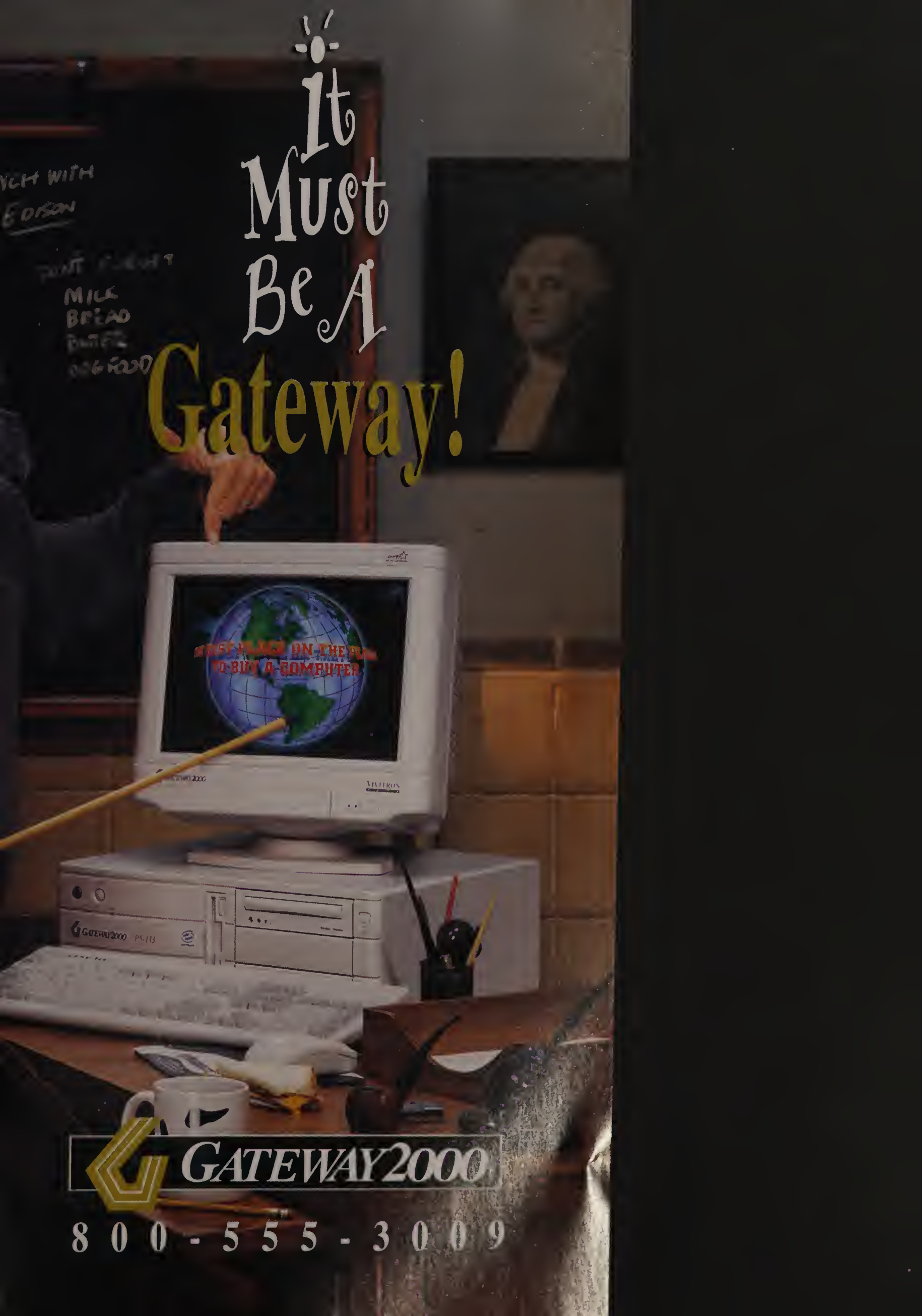
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If You're In Awe Of Your High-Flying Multitasking Machine...

The Gateway 2000® G6-200: A Legendary Performance

And if you just can't function without jet-set workstation power and performance — we're talking the top-flight machinery available today — then a new Gateway 2000 G6-200 is definitely for you! This new generation of workstations combines a 150MHz or 200MHz Intel® Pentium® Pro processor with the Windows NT™ Workstation operating system and a configuration that'll send you soaring into the wild blue computing yonder!

Pilot Your 200MHz Pentium Pro

The Pentium Pro processor is Intel's latest generation processor designed to provide workstation users with ultra-high performance in true 32-bit environments. The Gateway G6-200 is classified as a value workstation, perfect for Cad applications, intense desktop publishing, and graphics and design applications. If you require a load of memory and storage space to run your heavy-duty network applications, you won't find a better value from any other workstation manufacturer.

High-Flying Performance Features

To achieve the high throughput and superior performance your intense applications require, we've included a 2GB SCSI hard drive on the Gateway G6-200. SCSI technology offers better performance in workstation environments. The SCSI interface allows you to connect up to seven internal SCSI devices, so you can expand like never before. The G6-200 also includes the Adaptec® 2940 PCI Ultra SCSI controller card. Combine all this with 64MB DRAM and your workstation applications will fly!

Gearing Up for Great Graphics

With the Matrox® 2MB WRAM video card standard on the G6-200, you'll get incredible graphic support, including support for hardware accelerated 3-D. For work in higher resolutions, you can upgrade to 4MB WRAM for increased color depth and 3-D support in workstation environments.

Workstation Wonderland with Windows NT Workstation

All right, Windows NT Workstation customers, you know who you are. And we want to get to know you! Gateway 2000 now proudly offers you the best value on the Windows NT Workstation 3.51 operating system in the industry, standard on Gateway's G6 models. This is one of the most powerful operating systems for any organization that depends on a computer for today's most demanding data-intensive business applications. And if you value the reliability and security of privacy in large workstation environments, Windows NT Workstation is perfect for you.

Great news Windows NT 3.51 users! Your Gateway 2000 G6 system will arrive pre-loaded with Windows NT Workstation, ready to run! Simply determine and enter your individual security codes and passwords during initial setup. We'll configure all G6 systems with the appropriate Windows NT 3.51 drivers, loaded and optimized for compatibility with Gateway hardware and software.

Along with Windows NT, you get MS Office 95, Professional Edition for the best 32-bit business software applications available. And you can upgrade the P5-133 and P5-120 systems to Windows NT for a value that can't be beat! Call today for more information on our new G6 computers.

The G6-200 Professional system has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.

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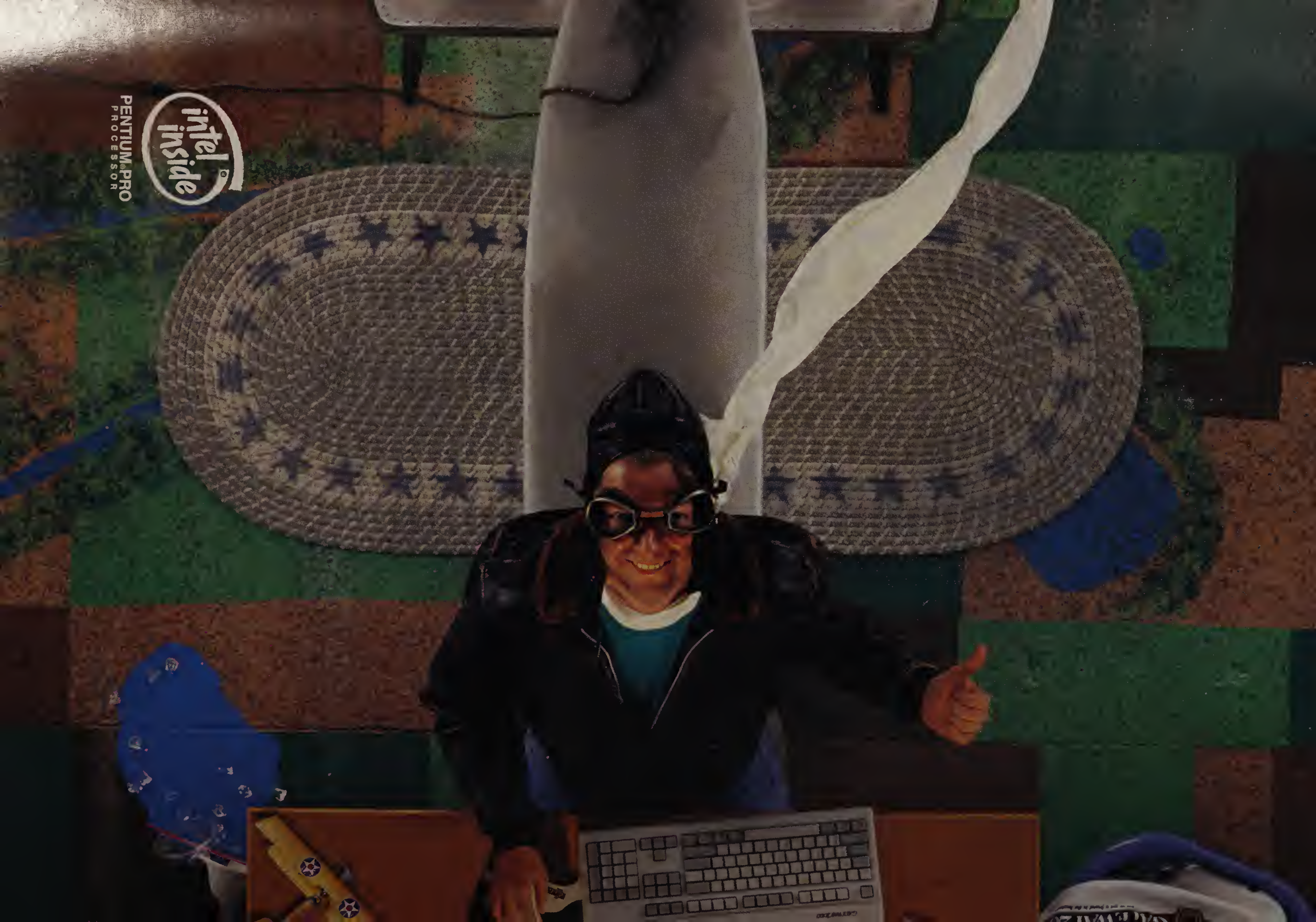
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- Altec™ Lansing ACS-40 Speakers
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P5-120

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P5-133

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G6-150

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G6-200

- Intel 200MHz Pentium Pro Processor
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- 256K Internal Cache
- 2GB SCSI 9ms Hard Drive
- Adaptec 2940 PCI Ultra SCSI Controller
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- 4X SCSI CD-ROM Drive
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Circle 148 on reader service card

Portable Pentiums for the Price Conscious

Shopping for a notebook PC can be an exercise in tradeoffs. You want a Pentium-powered system with all the multimedia trimmings. But you don't want to spend over $5000. We've found two notebooks that should meet many of your needs, but the products have some minor drawbacks that shouldn't be overlooked.

Economical Eurocom 5400

The Eurocom notebook series uses Pentium processors with speeds ranging from 75 MHz up to 133 MHz. We looked at the 5400, a $3590 100-MHz system with a 10.4-inch active color screen and a roomy 800MB hard drive. Even at its low price, the system is packed with high-performance hardware, such as a 256K secondary cache (expandable to 1MB), a video accelerator with 2MB of VRAM, and an internal quad-speed CD-ROM drive. The 16-bit audio subsystem supports two built-in speakers. For fun and games, the notebook includes a built-in joystick.

The Eurocom 5400 offers adequate expandability. It sports a PC Card slot that can accept two Type II or one Type III cards. An optional Mini Docking Station offers two ISA expansion slots and another PC Card slot. For extended periods away from a wall socket, the notebook lets you snap an additional battery onto the back for extra life.

While its internal features are impressive, we found the ergonomics less so. The active color screen supports 640 by 480 resolution in 16.8 million colors. The 10.4-inch screen is adequate but unremarkable, considering that 11-inch screens are becoming de rigueur for Pentium notebooks (even an 11.5-inch color dual-scan screen is available). The unit sports a wrist rest at the front of the oversize 86-key keyboard and a trackpad pointing device. But typing takes some getting used to: The alphabet keys are located one key left of their usual position to make room for the directional, page up, and page down keys that run along the right side.

The Eurocom 5400 also uses older NiMH battery technology, which adds to its heft. (The unit weighs a burly 7.7 pounds.) The external AC adapter adds weight as well. Still, if the keyboard works for you, the Eurocom 5400 offers a lot of notebook at a small price.

Eurocom 5400

Great price on 100-MHz Pentium multimedia notebook.
Eurocom Corp.
613/224-6122
List price: $3590 with active color screen
Reader service no. 748

Satellite Pro 410CDT

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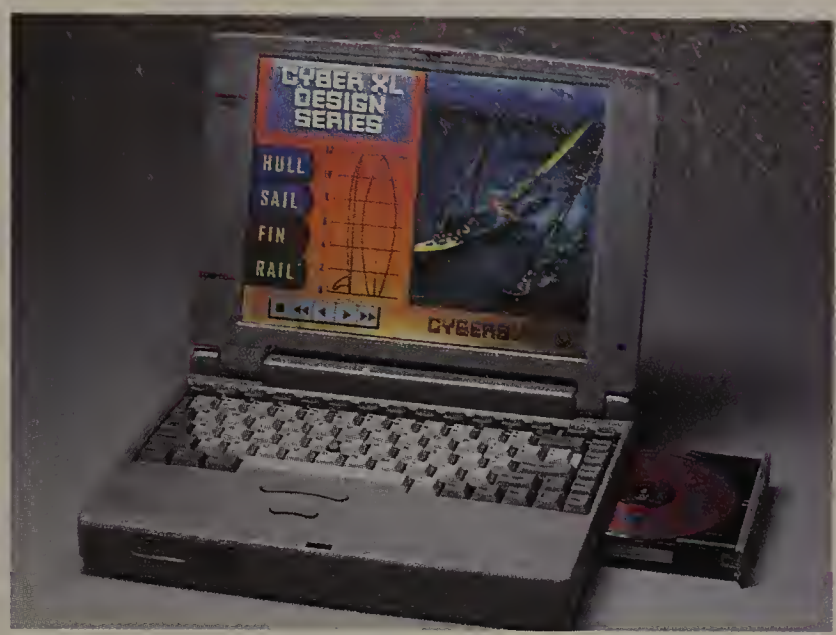
Toshiba Computer Systems Division
800/999-5273
List price: $4699 with active color screen
Reader service no. 749



VIEW WITH ROOM: The 410CDT offers an impressive SVGA 11.3-inch active-matrix screen at an economical price.

New Satellite Pro 410CDT

When compared to the Eurocom line, Toshiba's Satellite Pro 410 series provides greater expandability and some higher-quality components. At a list price of $4699, though, the Satellite Pro 410CDT costs more than the Eurocom 5400. What's more, it includes no secondary cache and sports a less-powerful 90-MHz Pentium processor. So what do you get for the extra money? At the top of the list is the impressive 11.3-inch active-matrix screen that can display resolutions up to 800 by 600 at 65,536 colors. The screen was bright and easy to view even when we were off to the side of the unit, an important consideration if you need to make presentations to small groups.

For expandability, the quad-speed CD-ROM drive can be swapped out with the included 3.5-inch floppy drive. (If you need to use both drives, the floppy drive can be popped into an included caddylike device that plugs into the back of the notebook.)

The Satellite Pro 410CDT includes a built-in AC power supply that lets you plug a cord into the notebook—so you don't have to lug around (and possible lose) the external AC "brick" adapters common on many notebooks. For portable power, there's a lithium-ion battery. And with all that, the Toshiba still weighs in at a svelte 7.4 pounds.

Besides the relatively low speed processor and high price, our only other beef with the product is its sound system. The notebook's solitary speaker has limited volume. When we turned the volume up, the sound was tinny and distorted, like music from a cheap transistor radio. But all things considered, this reasonably priced, solid notebook from a top-tier vendor is worth a look.

—Gabrielle Mitchell and Randy Ross

SCSI for Dummies: Plug and Play That Performs

SCSI has been a longtime four-letter word in my house. When I installed my first SCSI adapter it took two friends and me the better part of a Saturday and almost $60 in technical support phone charges to get my system working just right.

Given my hesitation to leap into another SCSI ordeal, I was the ideal candidate to check out the AdvanSCSI ABP930, a SCSI card that promised to be truly Plug and Play.

Plugging it in was as simple as finding a free PCI slot. The included boot disk took me step-by-step through the installation process. After I answered a few questions, the software diagnosed my system and I was ready to go. Unlike with my first SCSI experience, this time I had no jumpers or switches to set and no need to know such cyber-jargon as BIOS address, port address, or interrupts. This may seem like no big deal to Macintosh users or the technically blessed, but for a devotee of the *DOS for Dummies* book, Plug and Play SCSI is the greatest thing since the mouse. The only problem I encountered was that my CD-ROM drive adapter didn't match the AdvanSCSI external 50-pin connector. A quick trip to Radio Shack for an adapter, and I was in business.

Ease of installation doesn't mean lack of power. The device boasts true multitasking for better performance, and a 32-bit wide bus allows a transfer rate of up to 10 megabytes per second on the SCSI bus. Only Windows 95 supports the Plug and Play capability, but the card works with DOS, Windows 3.1, and Windows NT.

I won't say I'm a SCSI convert, but with the AdvanSCSI, it's no longer a four-letter word.

—Shane Mooney

ADVANSCSI'S TROUBLE-FREE PLUG AND PLAY takes the hassle out of SCSI, but not the performance.

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Fast Workgroup Printing for Less

Texas Instruments has introduced two new workgroup printers and a new personal printer. The microLaser Pro/8 and microLaser PowerPro/12 replace the microLaser Pro 600 and microLaser PowerPro, respectively. The new microLaser Win/4 is designed for home and small-office users.

Retailing for $499, the 4-page-per-minute microLaser Win/4 prints at 600 dots per inch with a 486 or better system and at 300 dots per inch with other models. Designed to work with Windows 3.1 and Windows 95, it features an especially versatile print driver. The new driver uses animated graphics to show print status. It can print custom watermarks on a page, and it lets you print multiple pages on one sheet of paper for drafts, presentations, or paper conservation. Brightness, contrast, and halftoning methods can be adjusted to optimize gray-scale output for charts, photographic images, and line art.

The printer is compact—occupying less than 1 square foot—and weighs in at only 11 pounds. It's also EPA Energy Star compliant; just plug it in, and it sits in an energy-saving sleep mode until your Print command awakens it.

In our informal tests, the microLaser Win/4 seemed to print quickly, and its 600-dpi resolution made text readable to a minuscule 2-point size.

The 600-dpi, 8-ppm microLaser Pro/8 replaces the microLaser Pro 600. At $1299 list, it costs 28 percent less, and it has twice the paper capacity—holding 500 sheets in two trays. The 600-dpi, 12-ppm microLaser PowerPro/12 replaces the microLaser PowerPro, and at $1599 list, it costs about 16 percent less. The Pro/8 and Pro/12 include additional resident fonts and a newer version of Adobe PostScript Level 2.

All models are covered by a 30-day money-back guarantee and a one-year warranty and have a 72-hour repair turnaround time, with on-site pick-up and delivery.

—Bill Underwood

microLaser Win/4, microLaser Pro/8, microLaser PowerPro/12

Texas Instruments updates its microLaser line.
Texas Instruments
800/848-3927
List price: microLaser Win/4 $499, microLaser Pro/8 $1299, microLaser PowerPro/12 $1599
Reader service no. 751

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Logitech PageScan Color: Small Size, Big Results

With sophisticated desktop publishing features now being packed into even the simplest of word processors, users are looking for ways to import images into documents. Even in the most orderly of offices, there's usually not much room on the desk for all the necessary peripherals, let alone for something exotic like a scanner. But a pint-size sheet-fed scanner can be impressive not only in performance but in ease of setup and use. The Logitech PageScan Color is such a product.

The PageScan, which is no bigger than a bread box, connects to your computer's parallel port. A pass-through feature allows you to connect both the scanner and your printer to the same port. I used this feature and found my Windows 95 system and my Epson Stylus 800 accepted the setup without so much as a hiccup.

Like other compact scanners, PageScan lets you scan photos and documents at a maximum of 200 dots per inch. Unlike some competitors, however, it lets you scan them as 24-bit color images. PageScan also allows you to scan items for faxing. The setup program identified the fax software on my system and launched it automatically when I was ready to fax.

Scanning bulky or odd-size documents is a snap because the PageScan scanner head detaches from its base for manual use. Also, with PageScan you can stop a scan in progress, scanning only what you need. If, for example, you want an image from a magazine page, detach the PageScan's head and scan just the image rather than the whole page.

PageScan comes bundled with Xerox TextBridge OCR, PageScan Image Editor, and PaperMaster SE software applications. I was impressed by the accuracy of the TextBridge software. It wasn't perfect, but it seemed very accurate with my documents. Any mistakes in the scanning process can be cleaned up with PageScan Image Editor. If your goal is a paperless office, DocuMagix's PaperMaster SE lets you create an electronic file cabinet on your hard drive; you can scan documents directly into it.

The unit incorporates some other nice touches. The AC adapter, for example, won't take up extra space on your power strip. The power cord has a standard plug, with the transformer in the middle of the cord rather than at the end where it would block a neighboring outlet.

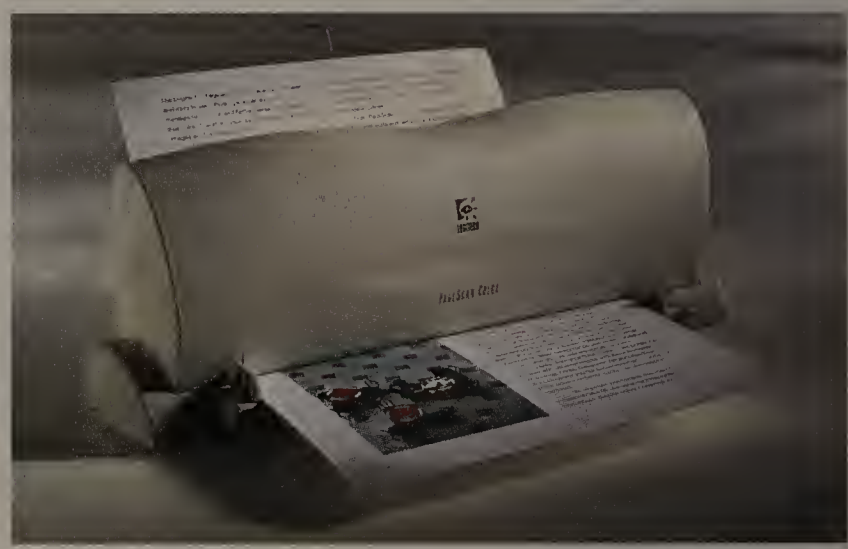
Another thoughtful feature: The power and cable cords are long enough to negotiate even the most complicated office arrangement.

Logitech has done its homework on this product and created a smart scanner that doesn't claim too much real estate.

—John P. Mello, Jr.

Logitech PageScan Color

Effortless scanning through a parallel port.
Logitech
800/231-7717, 510/795-8500
Street price: $399
Reader service no. 752



SCAN COLOR DOCUMENTS and faxes on the compact PageScan.

The Joy of Pointing

The keyboard joystick, a tiny button that pokes out from the center of the keyboard between the G and N keys, is a common enough sight, but now the joystick has moved to the desktop. Interlink Electronics' DeskStick works in the same way a keyboard joystick does, moving the screen pointer in response to fingertip pressure.

This version of the mini-joystick sits in a symmetrical plastic case with buttons on both sides so it doesn't discriminate against lefties. Interlink claims DeskStick, which lists for $59.95, can cut the desktop real estate a mouse and mouse pad require by as much as 70 percent, though this estimate may be optimistic. The same design that saves space on the laptop translates to a desktop device almost twice the size of my mouse but only slightly smaller than my trackball.

DeskStick uses Interlink's VersaPoint Pressure Pointing technology, which converts pressure on the device into directional force that propels the screen pointer wherever you want it to go. When I used DeskStick, I found myself accidentally clicking its buttons when trying to maneuver the pointer. If I braced my hand against the device while using my index finger to try moving the cursor diagonally, I inadvertently clicked a button. The finger movement takes some getting used to, and while wrist and hand movement is virtually eliminated, the pressure on my finger seemed more uncomfortable than with other pointing devices.

—Pete Loshin

DeskStick

Puts laptop pointer "stick" on your desktop.
Interlink Electronics
800/340-1331, 805/484-1331
List price: $59.95
Reader service no. 753

You'd think she just got a Quantex.

That look of confidence and inner pleasure. It's a look that's become associated with buying a Quantex. And it shouldn't be the least bit surprising. You see, Quantex gives you just about the best buy going. And that means more than just a good price. It's the very latest technology. The hottest software bundles. Quality components from some of the most trusted names in the business. And a company committed to giving you their best day in and day out.

If Quantex had been around back in Mona's day, she probably would have had a much bigger grin.

intel inside pentium® PROCESSOR

Designed for Microsoft® Windows® 95

Put Our Masterpieces

A Classic Deal

At Quantex, all of our systems are composed of the hottest features, tuned up for top-rated performance, then competitively priced to provide the maximum bang-for-your-buck. These masterpieces have the experts singing their praises!

As *PC World* reports, "Quantex offers the best price/performance ratios on PCs..." (August 1995). *Family PC* raves that "The QP5's list of hardware features reads like those of machines typically priced around $400 higher" (July/August 1995). And *PC Magazine* writes that our SM-1 provides "Above-average components for a great price..." (Sept. 26, 1995). Quantex consistently gives you more for less, constantly striving to bring you the very best deal.

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Any PC maker can use no-name components to take their price down. That's just not good enough for Quantex. You'll find that our value-packed systems feature more of the brand names you've come to know and trust. Like Intel, Microsoft, Novell, STB Systems, Western Digital, MAG Innovision, Altec Lansing Multimedia, Ensoniq, and Toshiba to name a few. But using top quality components is only half the story. We guarantee the total reliability of our systems with one of the most comprehensive quality control processes in the business. So don't settle for imitations – get the real deal from Quantex!

To Work For You

Designed for Microsoft Windows 95

Start

All Quantex systems are not only equipped with Windows® 95 – they're *Designed for Windows 95*. As one of few companies to have passed strict Microsoft® Hardware Compatibility Testing, all of our systems are Plug and Play compliant to make adding new components a snap! For superior performance, check out these advanced components on our QP5/SM-2:

Performance-Enhanced Memory

Get extreme – our QP5/SM-2 features 16MB EDO RAM. The 16MB guarantees optimum software operation, while EDO boosts memory access speeds an additional 33%! Plus, we give you a 256KB L2 Pipelined Burst Cache for extra rendering power. Working together, EDO and the Pipelined Burst Cache cuts the processing time of memory operations, maximizing your system's execution rates to accomplish tasks faster.

Breakthrough Graphics and Media Acceleration

Enter the world of STB PowerGraph 64 Video Acceleration, the experts' choice for complete MPEG playback with full screen and full motion video. This high-performance 64-bit video graphics accelerator with 2MB EDO DRAM is based on the S3 TRIO64 V+ Chipset. That translates into no-holds-barred power, supporting up to 30 frames per second, resolutions up to 1280x1024, plus precise true color for photo-realistic imaging.

Massive Storage Power

An immense 2GB Mode 4 Hard Drive offers the capacity and performance you need to fully optimize Windows 95. In fact, it's the flat-out highest capacity ATA-2 Interface drive to date. Plus, its speedy 16.6 MB/sec data transfer rates, 5400 RPM, 256KB multisegmented cache buffer, and 10ms seek times deliver huge masses of data in a flash.

Digitally Controlled Color Monitors

The MAG 17" Color Monitor boasts complete Plug and Play support, a .26mm dot pitch for ultra-sharp display at 1280x1024 maximum resolution, rapid refresh rate, and a digitally controlled display. It's easy to see why MAG is the world's best selling 17-inch color monitor.

Above System features QP5-SM2

Multimedia That Will Move You

Quantex has teamed up with the multimedia hardware heavyweights to put together a system with premium stereo sound and image quality. Transport yourself to the world of multimedia with the ultra-fast, ultra-smooth MPEG performance of Aztech's 6X EIDE CD-ROM Drive, which boasts a 900 KB/S transfer rate and a 256KB buffer! Then, close your eyes and indulge in the crisp highs and solid bass of the Ensoniq Wavetable Sound Card and Altec Lansing speakers with subwoofer. It's top of the line multimedia at an affordable price, only from Quantex.

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And now, Quantex gives you an even faster and easier way to get information and assistance. Be a part of the Digital Revolution and visit the Quantex Home Page on the Internet at http://www.quantex.com. Check out features such as the Quantex Shopping Mall, Customer Service Center, Technical Support Center and Resource Room, all accessible 24 hours a day, 7 days a week!

QUANTEX

http://www.quantex.com

Family Software Bundle

- Novell PerfectHome: PerfectWorks; Memphis Math; Write With Me; InfoCentral; Grammatik; Clip Art for the Home; Clip Art for the Office; Read With Me 1 & 2; Hard Evidence: The Marilyn Monroe Files
- The 1995 Grolier Multimedia Encyclopedia
- Complete Reference Library (over 10 titles)
- Al Unser Arcade Racing
- USS Ticonderoga
- Animals II
- How Your Body Works
- Quicken Financial Manager-SE
- EveryWhere USA Travel Guide
- America Online, Prodigy, CompuServe (one month trial membership to on-line services)
- NetCruiser Plus (Free Internet Access of over 400 hours for one month)

Professional Software Bundle

- Novell PerfectOffice: WordPerfect 6.1; Quattro Pro 6.0; Envoy; InfoCentral; Presentations GroupWise
- The 1995 Grolier Multimedia Encyclopedia
- Complete Reference Library (over 10 titles included)
- SharkWare (The best way to manage your Contacts, Calendar, Phone Calls and To-Do list)
- Quicken Financial Manager-SE
- Astound (#1 in Multimedia Presentations)
- Phone Disc Business '95
- Al Unser Arcade Racing
- USS Ticonderoga
- America Online, Prodigy, CompuServe (one month trial membership to on-line services)
- NetCruiser Plus (Free Internet Access of over 400 hours for one month)

intel inside pentium® PROCESSOR

Designed for Microsoft Windows 95

QP5/75 M-1 $1599

- Intel 75MHz Pentium® processor
- 8MB EDO Performance-Enhanced Memory
- 1GB EIDE Mode 4 Hard Drive
- 3.5" 1.44MB Floppy Drive
- 64-Bit PCI Graphic Accelerator w/ 1MB (MPEG Playback w/Full Screen & Motion Video)
- 15" MAG Flat-Screen 1280x1024 Monitor
- 14,400 Baud Fax/Modem w/voice mail
- Tashiba 4X 190ms EIDE CD-ROM Drive
- 16-Bit Stereo Sound Card
- Magnetically Shielded Speakers
- Newly Designed Mini-Tower Case
- 104-Key keyboard & Microsoft® Mouse
- Microsoft Windows®95
- Family Software Bundle (preinstalled)

QP5/100 M-1.....$1699
QP5/120 M-1.....$1749

QP5/100 M-2 $1849

- Intel 100MHz Pentium processor
- 8MB EDO Performance-Enhanced Memory
- 1GB EIDE Mode 4 Hard Drive
- 3.5" 1.44MB Floppy Drive
- 64-Bit PCI Graphic Accelerator w/ 2MB (MPEG Playback w/Full Screen & Motion Video)
- 15" MAG Flat-Screen 1280x1024 Monitor
- 28,800 Baud V.34 Fax/Modem
- 6X EIDE CD-ROM Drive
- 16-Bit Stereo Sound Card
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- Microsoft Windows95
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QP5/133 M-2.....$1999

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- Intel 120MHz Pentium processor
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- 1.2GB EIDE Mode 4 Hard Drive
- 3.5" 1.44MB Floppy Drive
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- 15" MAG Flat-Screen 1280x1024 Monitor
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- Tashiba 4X 190ms EIDE CD-ROM Drive
- 16-Bit Stereo Sound Card
- Magnetically Shielded Speakers
- Newly Designed Mini-Tower Case
- 104-Key keyboard & Microsoft Mouse
- Microsoft Windows95
- Family Software Bundle (preinstalled)

QP5/75 M-3.....$1849
QP5/100 M-3.....$1949
QP5/133 M-3.....$2099

QP5/133 M-4 $2349

- Intel 133MHz Pentium processor
- 16MB EDO Performance-Enhanced Memory
- 256KB Pipelined Burst Cache
- 1.2GB EIDE Mode 4 Hard Drive
- 3.5" 1.44MB Floppy Drive
- STB 64-Bit PCI Graphic Accelerator w/ 2MB (MPEG Playback w/Full Screen & Motion Video)
- 15" MAG Flat-Screen 1280x1024 Monitor
- 28,800 Baud V.34 Fax/Modem
- 6X EIDE CD-ROM Drive
- Ensoniq® 16-Bit Wavetable Sound Card
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- 104-Key keyboard & Microsoft Mouse
- Microsoft Windows95
- Family Software Bundle (preinstalled)

QP5/100 M-4.....$2199
QP5/120 M-4.....$2249
QP5/150 M-4.....$2449

QP5/133 SM $2399

- Intel 133MHz Pentium processor
- 16MB EDO Performance-Enhanced Memory
- 256KB Pipelined Burst Cache
- 1.6GB 9ms EIDE Mode 4 Hard Drive
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- ATI MACH 64 PCI w/ 2MB DRAM (MPEG Playback w/Full Screen & Motion video)
- 15"MAG Flat-Screen1280x1024 Monitor
- 28,800 Baud V.34 Fax/Modem
- Tashiba 4X EIDE 190ms CD-ROM Drive
- Ensoniq 16-Bit Wavetable Sound Card
- Altec Lansing ACS-5 Speakers
- Newly Designed Mid-Tower Case
- 104-Key keyboard & Microsoft Mouse
- Microsoft Windows95
- Professional Software Bundle (preinstalled)

QP5/75 SM.....$2149
QP5/100 SM.....$2249
QP5/120 SM.....$2299

QP5/150 SM-1 $2799

- Intel 150MHz Pentium processor
- 16MB EDO Performance-Enhanced Memory
- 256KB Pipelined Burst Cache
- 1.6GB 9ms EIDE Mode 4 Hard Drive
- 3.5" 1.44MB Floppy Drive
- STB PowerGraph 64 Video w/ 2MB EDO RAM (MPEG Playback w/Full Screen & Motion video)
- 17" .26dp MAG 1280x1024 Monitor
- 28,800 Baud V.34 Fax/Modem
- 6X EIDE CD-ROM Drive
- Ensoniq 16-Bit Wavetable Sound Card
- Altec Lansing ACS-5 Speakers
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- 104-Key keyboard & Microsoft Mouse
- Microsoft Windows95
- Professional Software Bundle (preinstalled)

QP5/100 SM-1.....$2549
QP5/120 SM-1.....$2599
QP5/133 SM-1.....$2699

QP5/166 SM-2 $3149

- Intel 166MHz Pentium processor
- 16MB EDO Performance-Enhanced Memory
- 256KB Pipelined Burst Cache
- 2GB ATA -2 Mode 4 Hard Drive
- 3.5" 1.44MB Floppy Drive
- STB PowerGraph 64 Video w/ 2MB EDO RAM (MPEG Playback w/Full Screen & Motion video)
- 17" .26dp MAG 1280x1024 Monitor
- 28,800 Baud V.34 Fax/Modem
- 6X EIDE CD-ROM Drive
- Ensoniq 16-Bit Wavetable Sound Card
- Altec Lansing ACS-31 Speakers w/ subwoofer
- Newly Designed Mid-Tower Case
- 104-Key keyboard & Microsoft Mouse
- Microsoft Windows95
- Professional Software Bundle (preinstalled)
- Upgrade to ATI MACH 64 PCI w/2MB VRAM for $50 more.

QP5/120 SM-2.....$2749
QP5/133 SM-2.....$2849
QP5/150 SM-2.....$2949

Upgrade Specials

"Options Available with System Purchase"

- Ensoniq® 16-bit wavetable sound card and Altec Lansing ACS-31 Speakers w/subwoofer Add $99 (upgrade from systems with 16-bit sound card).
- Conner tape backup units: 850MB Add $159 3.2GB Add $199
- Microsoft Natural Keyboard Add $59
- Panasonic KX-6100 Laser Printer for $349 more. (6 ppm, 600 dpi class print quality)
- Call to upgrade to STB PowerGraph 64 Video w/2MB EDO DRAM.

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http://www.Quantex.com
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Paradox 7: Late to the Party but Worth the Wait

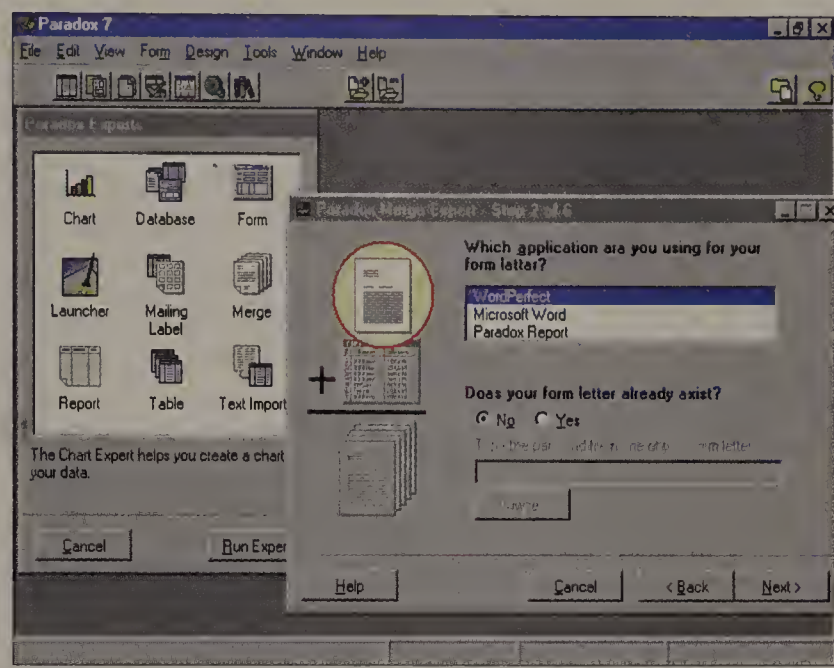
Borland wasn't as quick out of the gate with its Windows 95 version of Paradox as the competition was with its database programs, but after checking out a beta version of Paradox 7, I think it's in the running as best overall database application for Windows 95. Like the new Access and Approach, Paradox 7 for Windows 95 & Windows NT has many new features for both database beginners and sophisticates. There are more Experts (Borland's spin on the helpful Microsoft Wizard) to assist with all kinds of tasks, as well as easier access to data and numerous improvements in the menus and dialog boxes.

Getting Started

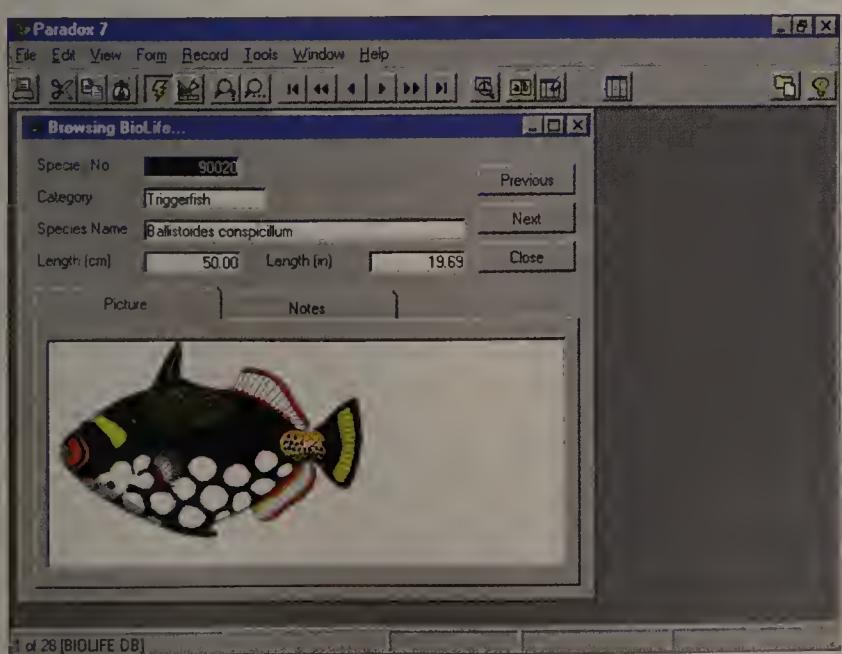
When you load Paradox, the first thing you see is an Expert that asks whether you want to create a new database or work with an existing one. I found this a bit intrusive but then realized this is just the kind of help a new user needs. You can turn any of the dozen or so Experts off if they get in your way.

I tried out the new Database Expert and found a list of predefined databases that include forms and reports, not just data files. I used the Launcher Expert to create a tabbed pushbutton menu for quick access to my database objects, without having to do any programming. The Launcher Expert, along with the Button Expert and others, makes up for the lack of macros (standard with both Access and Approach). In my opinion, a dearth of easy automation tools was the biggest problem in the older versions of Paradox. Borland has adequately addressed this issue by providing tools useful for end users and database application developers alike.

Throughout the program, I found the menus and dialog boxes easier to use than in older versions. Toolbars are now dockable anywhere on the Paradox desktop, and if you want, they can show buttons for tasks like aligning objects on a form and customizing text.



THE MERGE EXPERT and other on-screen helpers walk you through tasks that might otherwise be complicated.



QUERIES ARE SIMPLE with Paradox 7's browsing window, which shows both text and attached elements.

Also, Microsoft Office users should find the toolbars similar enough to Microsoft's to make Paradox fit in fairly well with the other Office programs.

Expert Advice

A few of my favorite Experts: The Merge Expert walks you through merging data managed with Paradox into Word or WordPerfect documents. You can choose to use a Paradox report design instead of a word processing document. The Label Expert is easier to use than in the last version, the new Import Expert has a window that lets you view ASCII data you're trying to import, and the Chart Expert helps you create visual summaries of data.

Borland didn't forget ObjectPAL programmers when it added new features to Paradox 7. I liked the editor, with its color highlighting and other features that professional programmers demand. Even better is the Object Explorer, which let me navigate through objects on a form and check their properties and events.

I didn't do formal performance testing, but Borland says users will get better performance out of Paradox 7 than with Paradox 5 (which performed well against earlier versions of Access and Approach). Even without performance enhancements, Paradox 7 is a quality database program for all levels of PC users.

—Celeste Robinson

Paradox 7 for Windows 95 & Windows NT

A great deal for new and current Paradox users, with more timesaving Experts that simplify database management.

Borland Int'l
800/233-2444, 408/431-1000
Street price: $299, upgrade $89, competitive upgrade $99
Reader service no. 662

Corel's Illustration/Photo Combo Complements Graphics Packages

If you need snazzy graphics for your presentations, print, or online publishing projects, newcomer CorelXara 1.1 is a godsend. This well-designed and easy-to-use program combines the best of draw illustration (vector) and photo manipulation (bit-map) technologies in one package. I examined a beta version.

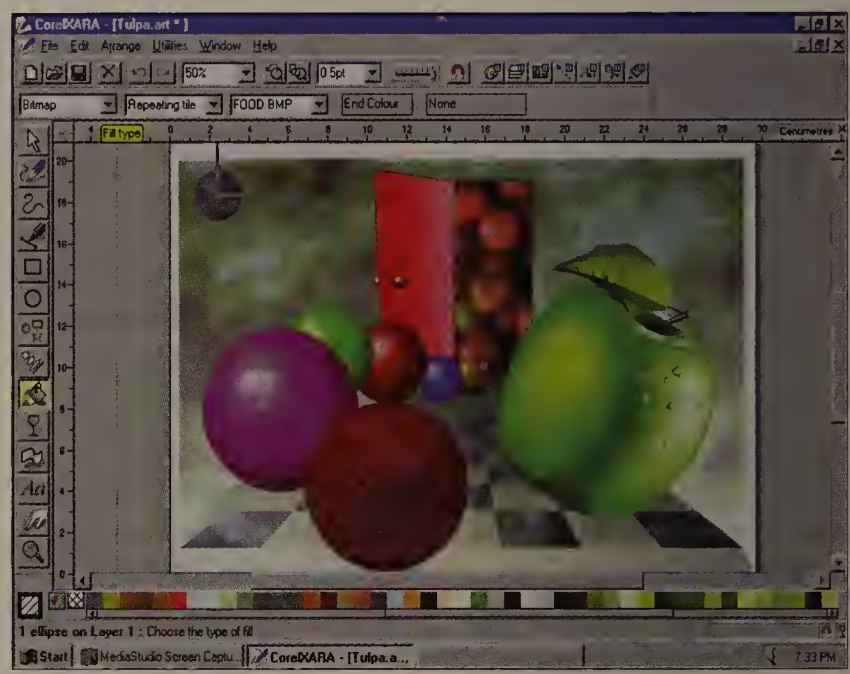
CorelXara is the first draw program to support semitransparent overlays, a powerful feature previously available only in bit-map editing programs such as Adobe Photoshop. This capability lets you apply any degree of transparency to any graphic object, text, or bit-map image in an illustration.

Equally impressive is CorelXara's ability to apply bit-map fills to graphic objects and text. You can use one of the supplied texture bit maps to create type that looks carved out of wood, for example, or use your own scanned images to fill objects and add a realistic touch to your illustration.

Many of the program's tools are easier to use than those in other draw packages. To create graduated fills and transparency effects, for instance, you click the tool, then the object you want to modify, and drag the pointer over the area where you want the effect to appear. On the flip side, CorelXara isn't as adept at technical drawings or professional color as CorelDraw. It also lacks CorelDraw's Bézier-curve knife and its eraser and dimensioning tools, and it doesn't support color separation. Because of limitations such as these, Corel is marketing CorelXara as a complement to high-end illustration packages like CorelDraw, rather than a replacement.

CorelXara runs under Windows 95, Windows NT, and Windows 3.1.

—Richard Jantz



CORELXARA'S VERSATILE TOOLS make it easy to combine vector drawings and bit-map images in the same graphic.

CorelXara 1.1

Easy-to-use two-in-one graphics package.
Corel Corp.
800/772-6735, 613/728-8200
List price: $289
Reader service no. 663

Jazzy 3-D Graphics on a Budget

Three-dimensional graphics, once the domain of high-end workstations, are rapidly going mainstream. Caligari's trueSpace/SE ($149) and Ray Dream's Ray Dream Studio ($499) are two new Windows 3-D packages that offer professional-level rendering and animation capabilities at bargain-basement prices.

Although trueSpace/SE and Studio are aimed at graphics and design professionals, they can be used by novices willing to take the time to learn them. Both products sport handsome, icon-rich interfaces that make it reasonably easy to access various features, and each provides an assortment of predesigned 3-D objects to get you started.

Both trueSpace/SE and Ray Dream Studio run under Windows 3.1, Windows 95, and Windows NT, but only Studio is a 32-bit application; it offers floating toolbars, tool tips, multithreading, and tabbed dialog boxes. However, Studio does not support OLE 2.0, so you can't embed objects. Also unique to the pricier Studio are wizards that guide you through complicated tasks. In addition, Studio, which I examined as a beta product, has advanced animation features, including fully editable time lines and inverse kinematics (used to create real-life character movements, such as shaking hands).

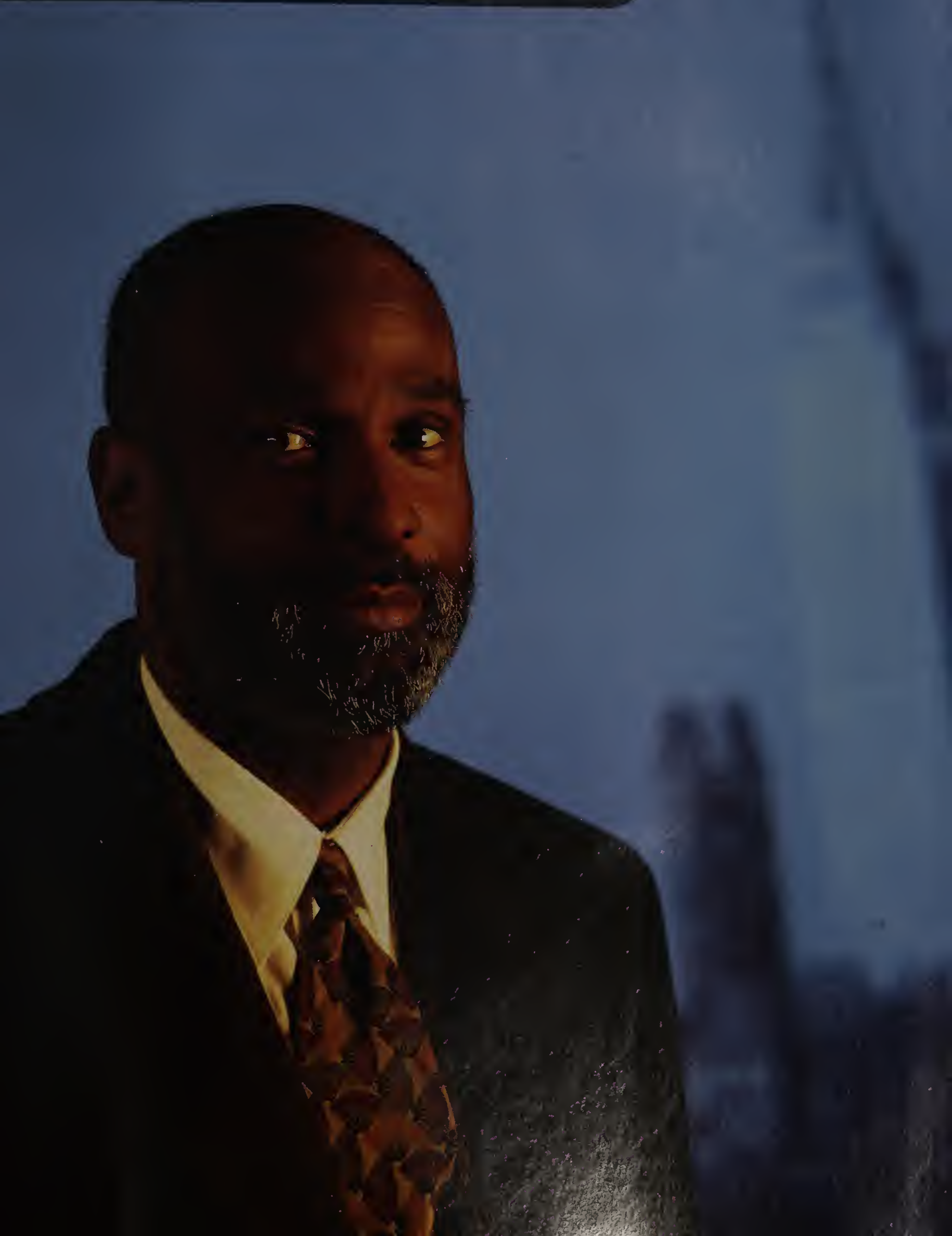
What distinguishes trueSpace/SE from other 3-D packages is its full-screen, 3-D perspective view. You do all your work—from drawing and arranging 3-D objects to setting the camera and lighting for your 3-D animation—within one window. (Studio requires you to use different windows to accomplish much of the same work.) Caligari offers two versions of trueSpace for Windows: I looked at a shipping version of trueSpace/SE, which is the entry-level version, and trueSpace2 ($795 list) is the high-end version, with features that more closely match those found in Studio.

—Richard Jantz

trueSpace/SE for Windows, Ray Dream Studio for Windows

Two powerful, approachable, and affordable 3-D graphics and animation programs.
Caligari Corp.
800/351-7620
List price: $149
Reader service no. 784
Ray Dream Inc.
800/846-0111
List price: $499
Reader service no. 664

Has lived in New York all his life.
Never visited the Empire State Building.



Novell May Work Perfection for Small Offices

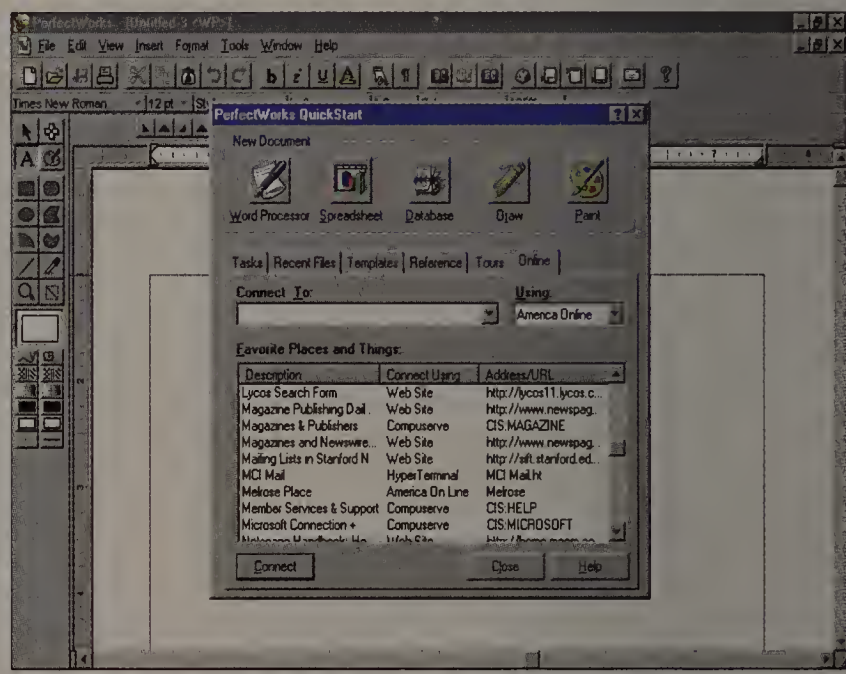
Not everyone needs an application suite. So-called works packages that offer simpler interfaces for common tasks are also priced lower than suites. And these packages require much less space on your hard drive. Novell's PerfectWorks 3.0 for Windows 95 is worth a look (I examined a beta version).

In this 32-bit version of PerfectWorks, the core modules (word processing, spreadsheet, database, and paint and draw) are more powerful, thanks to support for long file names and OLE 2.0. There's also new support for paging, fax, and e-mail protocols through Microsoft Exchange (a centralized in-box for e-mail messages and faxes), and for MAPI-based e-mail products. But PerfectWorks 3.0's real strength lies in its ease of use.

Choosing a starting point for a task is effortless: Simply click on one of the six new tabbed dialog boxes. The Templates tab gives quick access to 42 document templates. Another tab lets you get at your 15 most recently opened files, saving you from rummaging around your hard disk. The On-Line tab takes you directly to your online services and Internet connections. You can also store a list of favorite online service and Web sites and launch them from here. If you need help, try one of the Tours (videos showing how to use features).

PerfectWorks 3.0 faces stiff competition from Microsoft Works 95 ($74 on CD-ROM). But PerfectWorks ($50 to $60) includes a basic version of Quicken for Windows 95, a nice bonus. PerfectWorks is not part of the product line that Novell is selling off; it will remain a Novell product, a company spokesperson says.

—Gabrielle Mitchell



STARTING POINT: PerfectWorks' centralized task manager keeps track of your favorite online places.

PerfectWorks 3.0 for Windows 95

Win 95 interface makes this group of applications even easier to use.
Novell Inc.
800/451-5151
Street price: $50 to $60
Reader service no. 665

Forms More Functional Under Win 95

One of the most popular forms programs under Windows 3.1, OmniForm makes a strong case for forms under Windows 95. Version 2.0, a 32-bit application, maintains the simplicity and power of the 16-bit version while exploiting technical enhancements in Windows 95 to augment its previous arsenal of features.

For example, OmniForm works with Microsoft Exchange, so you can e-mail or fax the forms you create without switching away from the program. OmniForm also supports OLE 2.0, which lets you drag and drop items from other applications, like spreadsheets and word processors, into forms. Users in form-driven businesses, such as insurance companies, can easily complete and route forms electronically.

Although Caere says that the new OmniForm takes advantage of Windows 95's improved resource management to speed performance in a multitasking environment, the beta version I examined became sluggish when it was running with other applications. Drop-down menu help became slow-mo help, and there were irritating lags between mouse clicks and screen response.

In addition to Win 95–related improvements, the new version of OmniForm includes calculation fields, for mathematical operations like those in a spreadsheet, that can be created with the click of a button—handy for bankers. And a scrapbook feature lets you save frequently used items, such as a logo or an address block, in a scrapbook file. The items are saved as thumbnails that can be dragged and dropped onto a new form as needed.

Caere has also revamped the program's user interface, adding toolbars and an autoformat feature to quickly apply a specific look to a form. OmniForm will include versions for Windows 95 and Microsoft NT Workstation 3.51 (it will not run under Windows 3.1).

Is it worth upgrading to this Win 95 version? If Caere can fix the resource management problems, the roster of new features definitely makes the program a good buy.

—John P. Mello Jr.

OmniForm 2.0 for Windows 95

Create functional forms with sublime simplicity.
Caere Affiliate Publishing
800/535-7226
List price: $199 (through March 30, 1996)
Reader service no. 666

Was born and raised in Paris.
Has never been to the top of the Eiffel Tower.

Two Windows 95 Diagnostic Utilities Need Help Themselves

Windows 95 wasn't out long before utilities that could fix problems you might experience with the operating system began appearing. The trouble is, two utilities that I looked at had problems themselves.

Quarterdeck's WINProbe 4 and CyberMedia's First Aid 95 are two diagnostic programs designed to take the mystery out of Windows 95 glitches. Both programs, however, seem to have been rushed to market.

WINProbe 4 focuses on identifying hardware problems such as failing hard disks, while First Aid 95 concentrates on solving software configuration headaches. The programs include versions for both Windows 95 and Windows 3.1. The Windows 95 version of WINProbe 4, however, is only a 16-bit application—Quarterdeck expects to release a full 32-bit program soon—while the Win 95 version of First Aid is already a 32-bit application.

WINProbe 4

Windows 3.1 diagnostic program that pretends to be a Windows 95 program.
Quarterdeck Corp.
800/683-6696
Street price: $50
Reader service no. 679

First Aid 95

Windows 95 diagnostic program is rough around the edges.
CyberMedia
800/721-7824
Street price: $50
Reader service no. 667

WINProbe 4 provides over 50 tests and system information screens, some of which are very useful. Disk Utilization Information shows you, numerically and graphically, how much of your hard disk space is taken up by each of your subdirectories and folders. Unfortunately, because of its 16-bit nature, the utility truncates folder names that are longer than eight characters.

Several diagnostic tests didn't work. The audio test failed to detect a problem with broken speakers. And the CD-ROM test failed even to recognize any of the discs I inserted in my working CD-ROM drive.

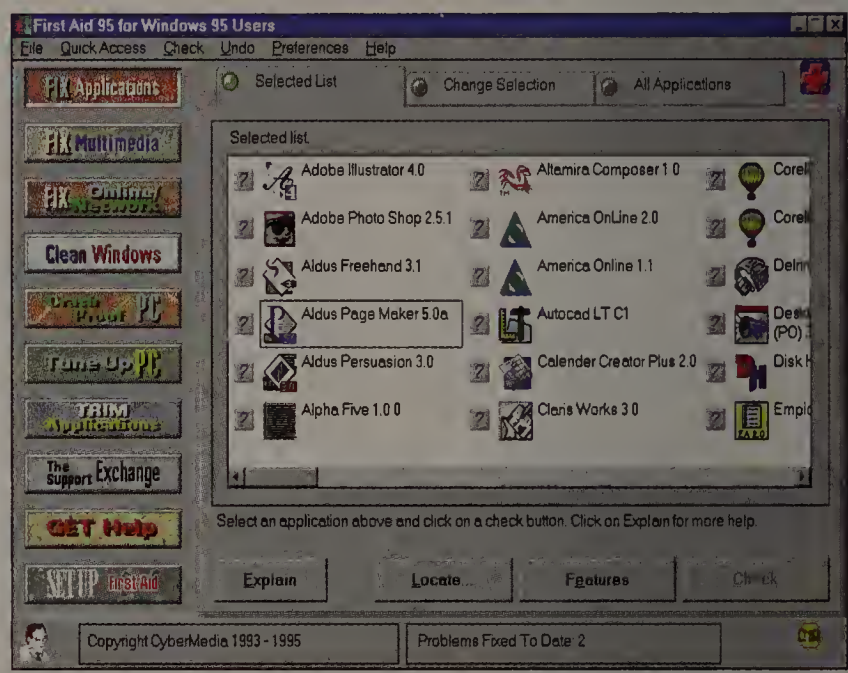
First Aid 95 fared only slightly better. The Fix Multimedia test gave me some good suggestions on speaker problems, such as making sure the speaker wire is connected to the out port on the sound card. And the Clean Windows test correctly identified and fixed references to a program I had previously deleted.

But the Fix Applications test frequently failed to locate program components even after I specified the program's location. It mysteriously insisted on checking the C: drive for programs I had loaded on my D: drive even after I told it where the programs were installed.

What's more, First Aid has inexcusable inconsistencies in its user interface. One onscreen prompt instructs you to press the Diagnose Problem button when this button is actually called Fix Problem.

Clearly, these two utilities need more seasoning.

—Reid Goldsborough



FIRST AID 95 CAN CHECK the integrity of over 75 applications, but it sometimes has problems locating a program's components.

AutoCAD 13: Time to Ditch DOS

Users of computer-aided design software are among the last bastions of MS-DOS loyalty, but they may face an insurmountable assault with the latest release of Autodesk's AutoCAD.

A 32-bit application, AutoCAD 13 exploits Windows 95's support of OLE 2.0, drag and drop, and long file names. Autodesk says you'll be able to run multiple sessions of AutoCAD, something you couldn't do with earlier versions. The program will also take advantage of Windows 95's connectivity features, such as peer-to-peer networking.

The Windows 95 version of AutoCAD maintains the intuitive interface that engineers and artists find helpful for their work, and customizable toolbars provide streamlined access to popular features.

With AutoCAD 13, Autodesk has finally reached the same page as other Windows applications. Menu layouts, file previewing, printer support, and online help conform with Microsoft Office's guidelines for Windows apps.

With the kind of power AutoCAD 13 gives you, it may be time to make the leap from outmoded MS-DOS versions to a 32-bit environment with multitasking and better memory management.

—John P. Mello Jr.

AutoCAD 13 for Windows 95

32-bit computer-aided design finally arrives.
Autodesk Inc.
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List price: $3750 (CD-ROM), $3995 (disk), upgrade $495
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New Back-UPS® Pro™ PnP
itself the first time you use

Experts agree: Windows 95 demands APC protection

plug & play

If you're using a computer, few things are more certain than power problems. If you haven't yet had a blackout, lost a hard drive, or toasted a modem, you will. It's almost a statistical certainty.

No surprise that *PCWeek* showed power problems such as blackouts, brownouts, and surges accounted for almost as much data loss as all other factors combined, or that a leading accounting firm attributed the largest single cause of computer downtime to—you guessed it—bad power.

Multi-tasking multiplies your risk of "*the big one*"

Multi-tasking operating systems like Windows 95 let you open and manipulate multiple files and applications at the same time. That's why, unfortunately, as *PC Magazine* says "When Windows 95 does crash, it's a horrible mess..."

Moreover, if you are "wired" to the Internet, an on-line service, or dialing into the office, you'll discover that phone lines are common paths for surges taking the express route direct to your motherboard.

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In short, if you still don't have proper protection (that $5 surge strip doesn't count) it's time to protect yourself before you kick yourself. Experts agree: If you choose not to decide on proper protection now, the next time you see this ad may be too late.

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More than 4,000,000 smart computer users protect against the inevitable with the affordable: award-winning power protection from APC, including the UPS that's winning praise the world over: the Plug n Play Back-UPS Pro. Ask them and they'll tell you: One prevented problem is all it takes to pay for proper power protection many times over.

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FOR AS LONG AS YOU OWN THIS PRODUCT, IF YOUR PROPERLY CONNECTED EQUIPMENT IS EVER DAMAGED BY AN AC SURGE, INCLUDING SURGES DUE TO LIGHTNING, APC WILL REPAIR OR REPLACE OUR PRODUCT AND UP TO $25,000 OF CONNECTED EQUIPMENT (SEE POLICY FOR DETAILS, VALID IN U.S. AND CANADA ONLY).

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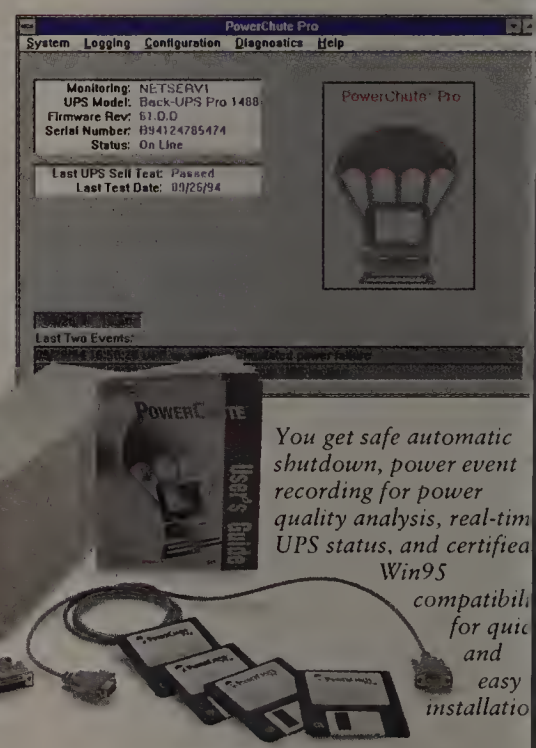

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"[With Windows 95]..Users have more data at risk than ever before... A UPS is quickly becoming a must... "
ComputerLife

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Microsoft

"★★★★...Should be standard equipment on every desktop... effective, affordable, designed to last."
PC Computing

"Pair your PC up with the right UPS, and PnP will safeguard it against short or long term power problems."
Windows Magazine

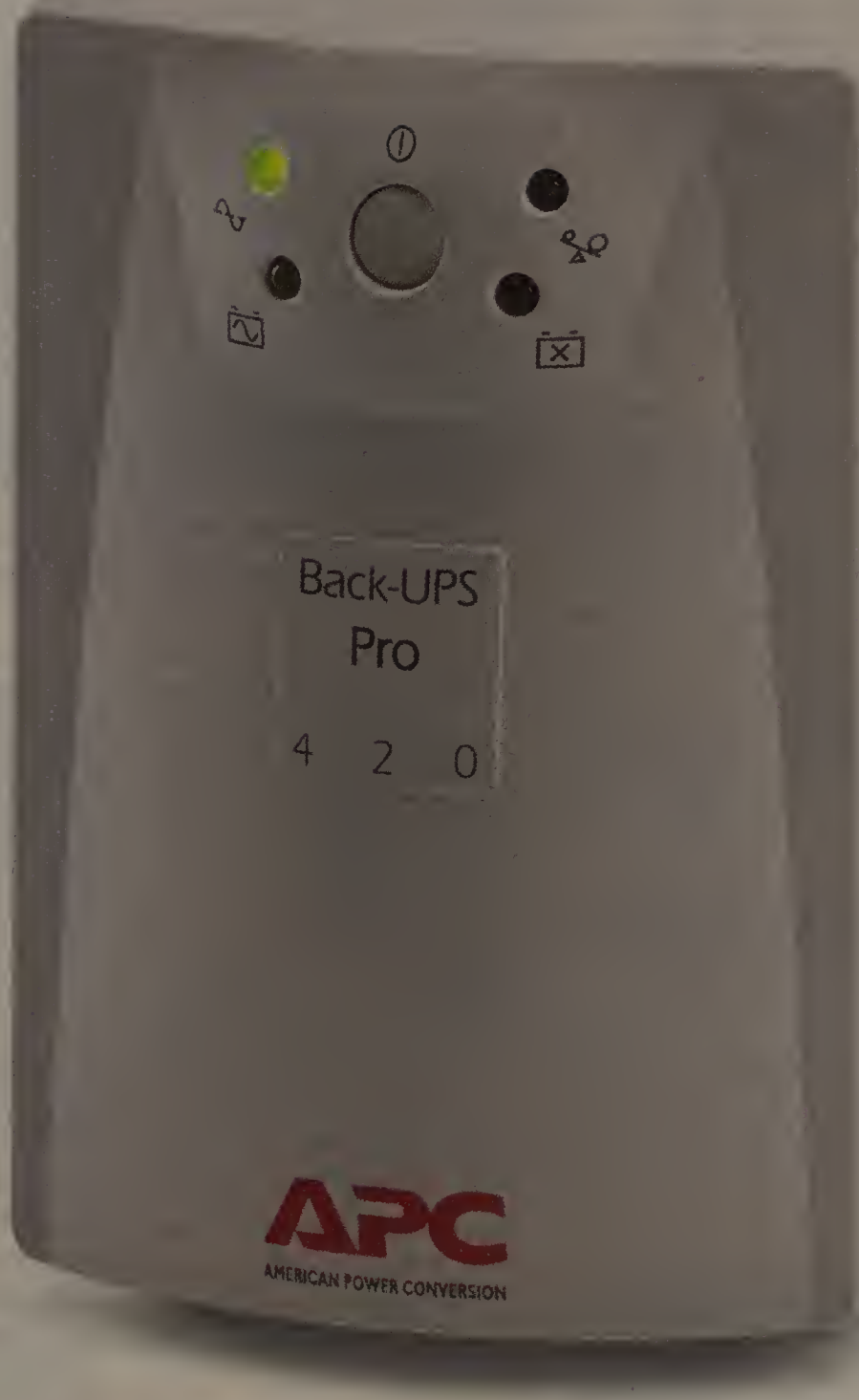
"APC's Back-UPS Pro saved the day just as expected."
Windows Sources

"99 out of 100"
Computer Gaming World

PC World 20 Best Upgrades

PC Magazine UK Editors' Choice

Windows Magazine Reader's Choice



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Volt-Amp Rating		List Price	Runtime*
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*Runtime shown is for typical Pentium desktop system and may vary with your actual load. Note. Back-UPS 200 not recommended for Pentium systems

Back-UPS

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400	(software not included)	$199	13 min
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600	(software not included)	$359	31 min
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Circle 45 on reader service card

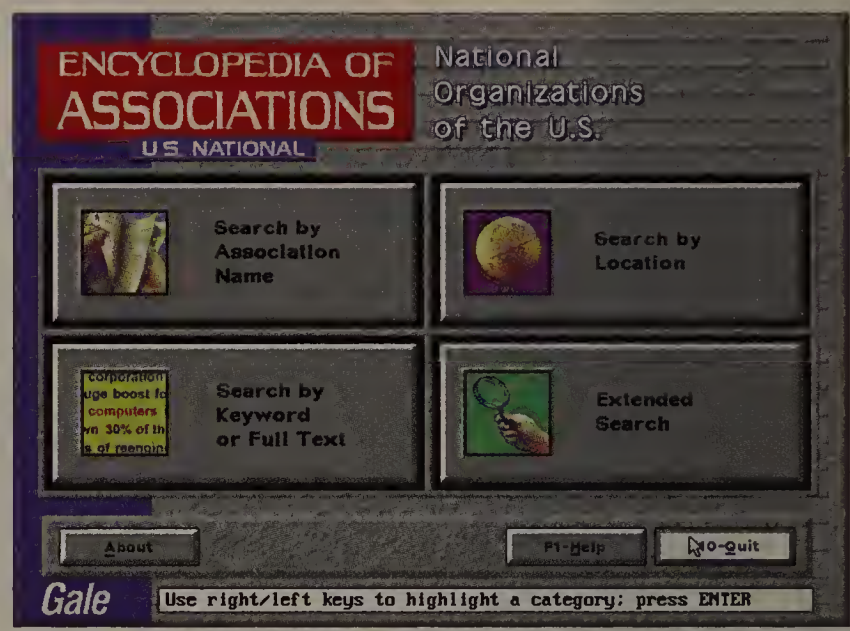
For $595, Let's Name That Association

What do America's Society of Divorced Men and the Calendar Marketing Association have in common? What does the Lawn Institute have to do with the American Medical Association? These groups are among the more than 22,000 professional and advocacy associations located in the United States. No matter how small the niche, an association is probably representing it. You'll find all the details in Gale Research's Encyclopedia of Associations: National Organizations of the U.S. The CD-ROM version of this definitive research tool fits three thick books' worth of information on one disc.

The software lets you search for an association by city, state, zip code, or area code, or by using keywords. You can also combine criteria: For example, you might search for all associations in Boston with annual budgets over $1 million.

The listings detail key personnel names, addresses, and phone numbers, organization publications, mailing list availability, conventions, and mission statements. Updated annually, this DOS-based program runs seamlessly under Windows 3.*x* and Windows 95.

—Michael S. Lasky



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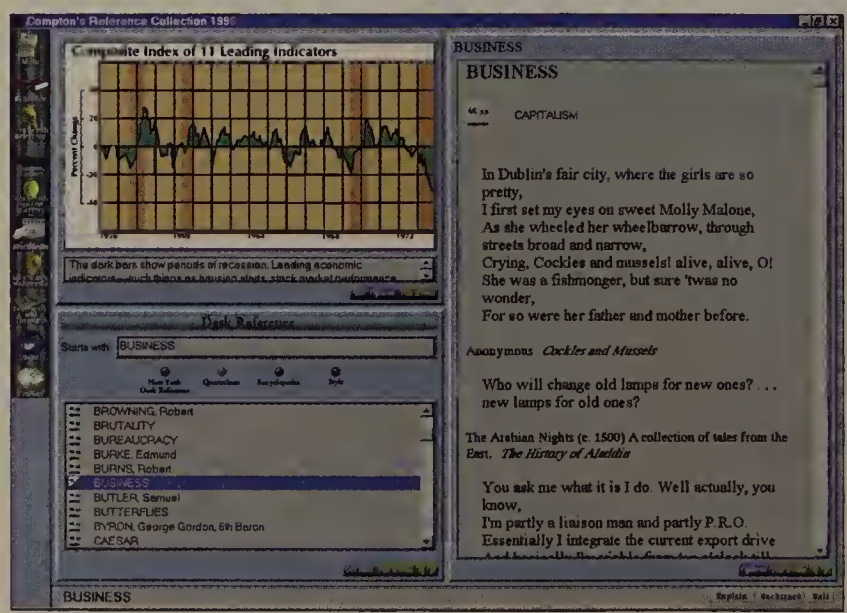
More Than Just the Facts, Ma'am

If you run a small business, quick access to information can be a godsend some days. Check out Compton's Reference Collection, a one-stop resource for your small business or home office. Packed with extras, including legal forms and tips on business letters, this $49.95 CD-ROM stands out from the crowd.

The single disc has two main sections: a Reference Center and a Business Center. The Reference Center supplies the material you'd find in standard reference titles, including a dictionary, a thesaurus, an atlas, and a book of quotations. You'll also find the *New York Public Library Desk Reference* and Compton's Concise Encyclopedia—a "lite" version of Compton's Interactive Encyclopedia that nevertheless includes 8000 pictures, 75 videos and presentations, and 15 hours of sound.

Compton's Business Center makes this CD-ROM unique. Writing a business letter? Consult *The Elements of Business Writing*, *The Elements of Style*, and *The Office Guide to Business Letters, Memos, and Reports*. And *J.K. Lasser's Legal and Corporate Forms for the Small Business* contains over 200 legal forms—nice, considering that some legal forms titles cost $49. Finally, Compton bundles with this disc two Pro Phone Home Phone CD-ROMs that contain 72 million U.S. residential telephone listings.

—Arden M. Hoffman



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PC WORLD BEST BUY

JUNE 1995 BYTE BEST OVERALL V.34 EXTERNAL MODEM

ProClass 288 LCD V.34

New Estimated Street Price: $359

PC WORLD June 1995
BEST BUY

- "the best combination of price, performance, features, and support"... way ahead of the pack."
- "best overall value in a V.34 modem."
- "the clear Best Buy in this roundup."

BYTE/NSTL LAB REPORT June 1995
BEST OVERALL

- "top honors in almost every aspect of our benchmarks."

EDITORS' Home Office COMPUTING PICK

COMPUTERWORLD I/S BRAND PREFERENCE 1994 BEST PRICE/PERFORMANCE

ProClass 288 MT V.34

New Estimated Street Price: $289

Practical Class 288 Mt II V.34

New Estimated Street Price: $199

HOME OFFICE COMPUTING Jan. 1995
EDITORS PICK AWARD

- "represents the cutting edge of today's telecommunications technology...and better priced."

PC MAGAZINE March 14,1995

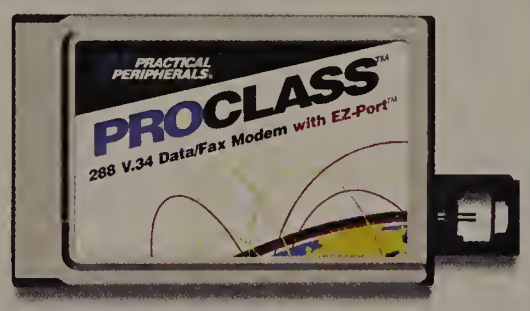
- "it's performance out distances even much more expensive modems."
- "by far a top performer overall."
- "best - performing modem."

COMPUTERWORLD I/S BRAND PREFERENCE BEST PRICE/PERFORMANCE

JUNE 1995 BYTE BEST OVERALL V.34 PC CARD MODEM

PCWEEKLABS ANALYST'S CHOICE DEC. 26, 1994

Mobile FIRST CLASS



ProClass 288 EZ-Port™

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PC WEEK April 3, 1995
ANALYST CHOICE

- "provided the most efficient built-in power management."
- "best combination of price and performance."

BYTE/NSTL LAB REPORT June 1995
BEST OVERALL

- "the modem ran extremely well, finishing first in our PC Card fax testing."

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Circle 191 on reader service card

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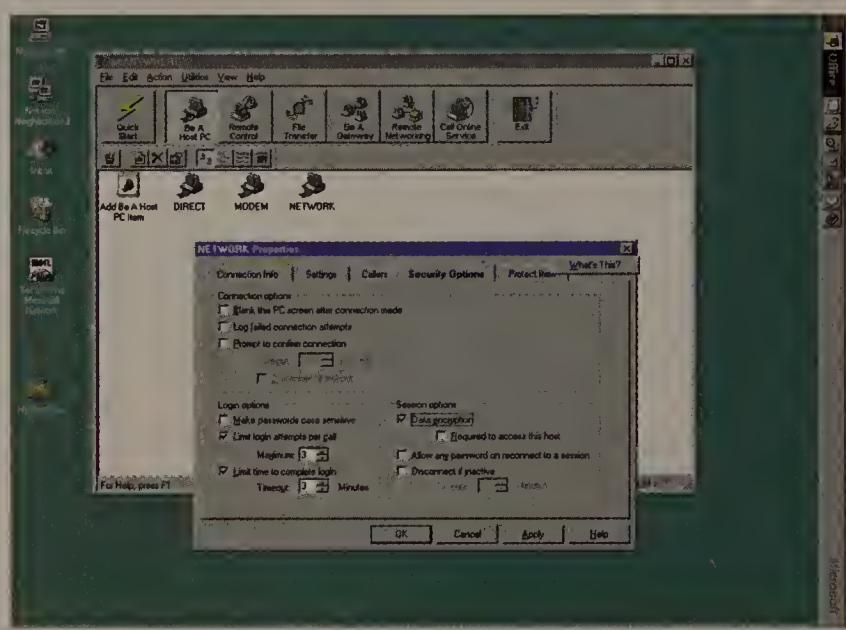
Circle 228 on reader service card

Finally, Popular Remote Control Packages Come to Windows 95

Remote control programs, due to their complexity, have taken longer than other types of software to make their way to Windows 95. But they are finally here. We examined beta versions of three products and liked what we saw. All the programs do a solid job of covering the three main tasks of a remote control program: remote control, file transfer, and online chats.

So how to choose among them? Here are some key features to look for: speed, file-transfer capabilities, roving callbacks (which let you call a host and give it a number at which to call you back, a handy feature if you're on the road), and features for PC support staff. Of course, you also must consider price. Though we weren't able to test the performance of these preproduction versions, we found important differences between them.



PCANYWHERE32 OFFERS EXCELLENT FILE-TRANSFER TOOLS, flexible security controls, and the ability to dial in to online services.

The Low-Price Option

Triton Technologies' CoSession for Windows 6.0 covers the basics and offers the lowest prices of the products discussed here. CoSession is a 16-bit program that has been modified for Windows 95 driver compatibility, which means you can expect it to run a bit slower than its 32-bit competitors. But the program supports Windows 95's long file names.

CoSession has already earned a reputation as a product well-suited for corporate help-desks, thanks to features such as its ability to log on to multiple systems simultaneously and to record and play back remote control sessions.

With version 6.0, Triton plays catch-up with the competition by including features of special interest to individual users. For example, version 6.0 offers improved file transfer features, such as a directory-synchronization utility that saves time by updating only the changed portions of files instead of the entire file. What's more, if you lose a connection while in the middle of a transmission, CoSession can pick up right where it left off. On the downside, CoSession lacks roving callbacks, a clipboard for moving selected data between systems, and a scripting language for automating procedures such as file transfers.

One Tool, Many Uses

If you're not sure which remote control package best suits your needs, give pcAnywhere32 a try. Of all the products that are reviewed here, Symantec's Norton pcAnywhere32 provides the widest array of features. Its excellent file-transfer tools and flexible security controls distinguish it from the competition. In addition, pcAnywhere32 includes terminal emulation for dialing in to online services.

Anyone who is already familiar with pcAnywhere 2.0 will find a number of enhancements in pcAnywhere32. A new ColorScale utility lets you reduce color levels on the fly to boost performance. Additional features include scripting, roving callbacks, and built-in automatic virus checking of any file prior to transfer.

The only notable drawback is that pcAnywhere32 lacks some of the high-end, multi-user connection capabilities that would be of interest to PC support technicians and network administrators.

Extras for PC Support Staff

Avalan Technology's Remotely Possible/32 offers a strong set of file-management tools, but its real fortes are its flexible connections and extensive security logs and controls. The product can connect to multiple systems at the same time, or an administrator can simultaneously host multiple remote sites—tricks beyond the ability of pcAnywhere32.

For auditing network events, Remotely Possible/32 can track who logged on or attempted to. The logs also include information on file transfers, user activities, and other data for troubleshooting communications.

These capabilities are generally of more interest to network managers than to individual users. In addition, like CoSession, Remotely Possible/32 lacks roving callbacks, scripting, virus protection, and data encryption.

—Patrick Marshall

CoSession for Windows 6.0

Basic features at a bargain-basement price.
Triton Technologies Inc.
800/322-9440, 908/855-9440
Street price: $89
Reader service no. 647

Norton pcAnywhere32

Full complement of features plus online communications.
Symantec Corp.
800/441-7234
Street price: $149
Reader service no. 648

Remotely Possible/32

Good candidate for PC and network support staff.
Avalan Technology
800/441-2281, 508/429-6482
Street price: $169
Reader service no. 649

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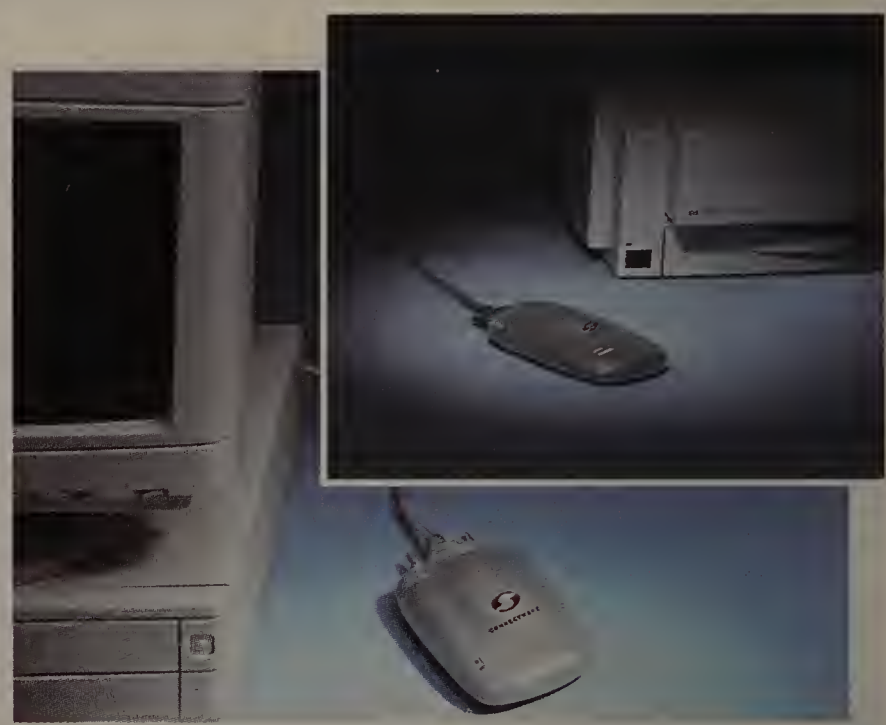
Printing the Wireless Way

AirPrint adapters seem like gadgets from *The Jetsons*. These sleek devices use wireless spread spectrum radio technology to communicate with each other, so your PC doesn't have to be tethered to your printer by a cable. As a result, you can easily send data to a printer located around the corner or down the hall. A small office could use these devices for wireless printer sharing, connecting as many as eight PCs to a printer.

AirPrint seems handy, but it's not cheap—and installation is confusing. Here's how it works. One adapter plugs into your printer's parallel port, and the other plugs into your PC's parallel port. Connectware bills its AirPrint adapters as "plug and print," but installation went more like this for me: Plug, try to print, read the thin manual several times, mess with the software for an hour, and call technical support. Forty minutes later, my Brother HL-630 laser finally printed. Tech support advised me to increase the time-out setting in the AirPrint software and increase the printer's transmission retry value through Control Panel in Windows. This worked, but the issue wasn't discussed in the manual's troubleshooting tips.

Connectware says the AirPrint adapters have a range of 3000 feet without obstructions, or 200 to 500 feet with an obstruction like an office cubicle wall. The adapters can transmit through drywall construction too, but not through thick concrete or steel walls. Two AirPrint adapters are $450. Connectware also sells devices that connect multiple PCs to one adapter. AirPrint seems useful for small businesses and multiple-computer homes, but it's a bit pricey in the end.

—Laurianne McLaughlin



WIRELESS PRINTING: AirPrint adapters connect your PC to a printer without running cables around the office—but installation is tricky.

AirPrint

Wireless printing and printer sharing doesn't come cheap.
Connectware, Inc.
800/449-0192
List price: $450 for two adapters, $250 each thereafter
Reader service no. 650

Untangling the World Wide Web

FrontPage 1.0, from Vermeer Technologies, is one of the first packages for nonprogrammers that combines editing software for creating Web pages with server software for publishing those pages on the Internet. The product runs on a variety of Windows platforms: 3.*x*, 95, or NT.

My only complaint is small: The product requires a lot of RAM—12MB is recommended when you run the server and editor simultaneously.

FrontPage Editor lets you create meaty Web pages without learning HTML (Hypertext Markup Language) or programming concepts. Editor lets you specify different styles for your text that are later converted to HTML tags in the saved files. It takes you beyond the basic Web formatting features now available in popular word processors, letting you create interactive forms that include fill-in fields, check boxes, and choice lists. Adding these features normally requires expertise in Common Gateway Interface programming.

FrontPage Explorer is a graphical tool for managing links between Web pages. Explorer graphically displays all the pages in a Web document, shows how they connect to each other, and helps you decide where to add new pages.

FrontPage Server, Internet software that puts your pages online, includes two versions: a 16-bit server for Windows 3.*x* (one of the few available for this platform) and a 32-bit server for Windows 95 and NT. The utility lets you manage Web sites remotely and offers basic Web server functions. The Web sites you create can automatically respond to requests for Web documents coming from browsers on the Internet. Vermeer says they plan to add support early in 1996 for the same secure Internet commerce standards used by Netscape's Commerce Server and other secure servers, but at a fraction of the price. With a list price of $695, FrontPage is a bit pricier than O'Reilly's $499 WebSite, another Web product aimed at nonprogrammers. But FrontPage offers more HTML editing tools.

—Pete Loshin

FrontPage 1.0

Complete and easy Web site publishing that doesn't require programming.
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List price: $695
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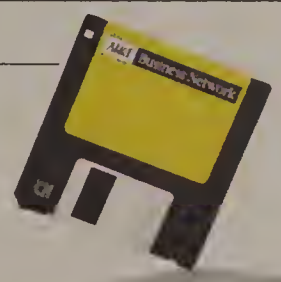

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How many times have you wished a technical guru lived inside your PC? Meet **WinProbe 4**, a suite of diagnostic and optimization utilities designed to prevent system crashes and improve computer performance. The program, which works with Windows 3.1 and Windows 95, monitors system resources, helps manage memory, and fixes problems such as Windows' failing to reallocate memory. It also provides nearly 300 suggestions for enhancing Windows performance. A helpful installation wizard keeps track of DMA channels, IRQ addresses, and other software and hardware information. At a street price of $49.95, WinProbe comes with five bonus programs, including CleanSweep 1.0, Mosaic, and RegIni, a 32-bit Windows 95 registry and .ini file editor. Quarterdeck, 800/683-6696.

Reader service no. 635

No Lawyer Required

With Kiplinger's **Small Business Attorney**, you can draw up simple legal forms for a small business. This CD-ROM provides more than 80 sample documents, such as offers of employment, limited warranties, and commercial lease agreements. Other letters and contracts cover finance, sales issues, asset protection, and more. This program is designed specifically for small businesses, and it doesn't advise about personal matters such as wills and divorce. Kiplinger's program should help your papers pass muster so that you can save on legal fees. Designed for Windows 3.1, Small Business Attorney runs on Windows 95 and Windows NT, the vendor says. Street price is $49.95. Block Financial Corp., 800/813-7940.

Reader service no. 636

Go Hand-Gliding

Let your fingers do the gliding with the new **Alps GlidePoint Keyboard**. Below the keys, you'll find a touch-sensitive GlidePoint touchpad to guide your pointer on-screen. For left mouse clicks, you can either tap the pad or use one of the three buttons set in a half-moon below. This keyboard has been updated for Windows 95 with an oversize <Enter> key and a key to call up context-sensitive menus, along with a split spacebar (half the bar is used for backspacing, usually by the nondominant hand). Alps Electric includes an attachable contoured wrist rest. The keyboard plugs into a PS/2 port but comes with both serial and 5-pin port adapters. It's compatible with Windows 95, Windows 3.1, DOS, and standard OS/2 and Windows NT drivers. List price is $149.95. Alps Electric, 800/825-2577, 408/432-6000.

Reader service no. 637

GYRATION GYROPOINT DESK: Here's a mouse that runs both on and off the desktop.

YOUR MOUSE WILL BE LONELY, but your fingers may be pleased with the touchpad on Alps Electric's newest keyboard.

This Mouse Flies

This mouse metamorphoses when you pick it up. The **GyroPoint Desk** plugs into your serial port and works much like a standard mouse on your desktop, except the click buttons are on the left instead of on top. But here's the fun part—this mouse can go airborne. Lean back in your chair, and hold the GyroPoint in your hand as you surf the Net or do other relaxed computing. As you move your wrist, a gyroscope inside the mouse senses the motion and moves the pointer on screen. It's somewhat like pointing a remote control unit at a TV. This product is compatible with Windows 3.1 or Windows 95. Street price is $100. Gyration, 800/316-5432, 408/255-3016.

Reader service no. 638

CD-ROM Racehorse

Plextor has created a speed demon with the **4PleX Plus**, a 4.5X CD-ROM drive. Building on the successful Plextor 4PleX drive, this souped-up newcomer boasts a data transfer rate of 675 kilobytes per second and a surprising 130ms random access time—faster than some 6X drives. The 4PleX Plus makes today's cutting-edge multimedia titles play the way they were intended and helps load new software quickly. The drive also comes with a host of new audio utilities, such as AutoPlay, audio scanning, and audio capture. It's designed for Plug and Play installation, so setup should be a breeze. Pricing is reasonable as well. The internal drive lists for $309, the external drive for $399. Plextor, 800/475-3986.

Reader service no. 639

Stop Forms Overload

Using **FormBuster** and a scanner, you can escape an avalanche of paper—or prevent it from engulfing you in the first place. This low-cost software lets you convert paper forms into electronic documents. Once the forms are scanned, you can enter new information directly or from popular databases. FormBuster also imports data from most Windows word processors and paint programs. Its support for popular image formats such as TIFF, JPEG, BMP, and TGA is helpful when you want to add graphics or signatures. The company says this 16-bit program designed for Windows 3.1 will run under Windows 95; a 32-bit version for Windows 95 should be available in early 1996. A version on CD-ROM, street priced at $49.95, includes

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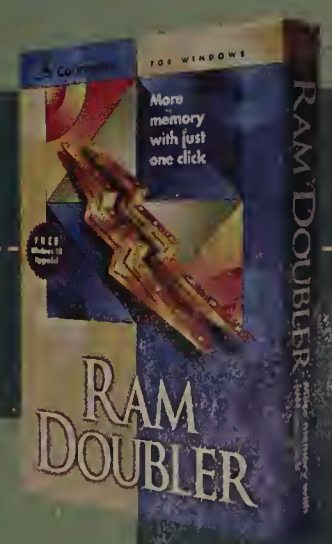

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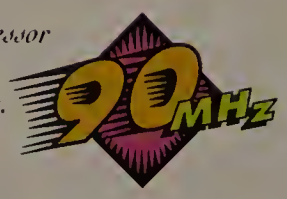

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One-Write Plus, a popular accounting and payroll package for small businesses, has graduated from the world of DOS. The new **One-Write Plus 5.0** is a 16-bit program that works with Windows 3.1 or Windows 95. This package handles general ledger, check writing, billing and invoicing, accounts payable and receivable, payroll, and budgeting. It includes new automation features and an interactive tutorial. There is now no limit on file size, so you can track 10 customers or 100. The list price is $89.95. NEBS, 800/882-5254.

Reader service no. 643

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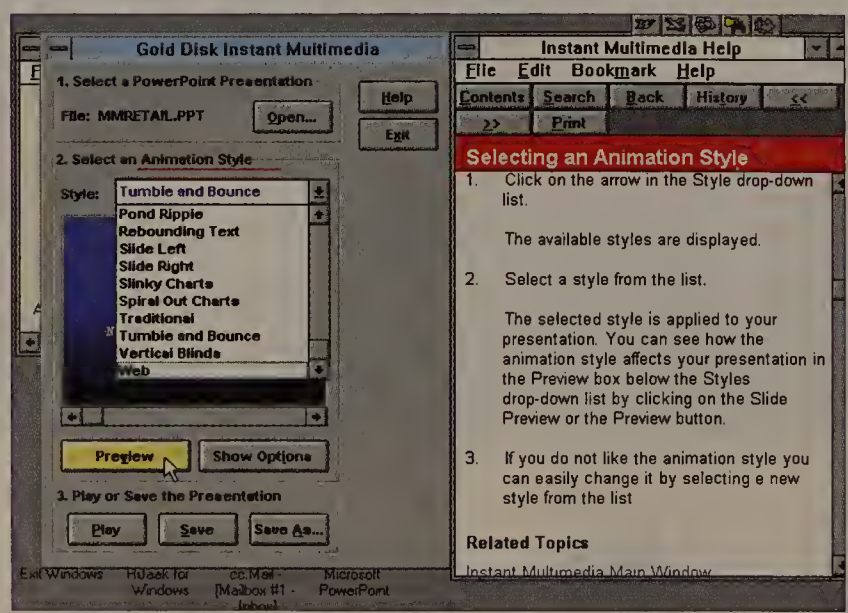
Many people use Microsoft PowerPoint, and maybe you've noticed their presentations sometimes end up looking and sounding alike. Want to stand out from the crowd? Gold Disk's **Instant Multimedia** add-on gives PowerPoint presentations extra zing. You can use the software to add animated transitions and sound overlays to an existing presentation or to create a new one. The animation styles are optimized to fit different PowerPoint templates. When you are done, you can save the presentation as a self-running .exe file for instant playback. Instant Multimedia supports PowerPoint 4.0 templates and layouts; a future version will support PowerPoint for Windows 95. List price is $49.95. Gold Disk, 800/982-9888, 408/982-0200.

Reader service no. 641



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A Strong OS/2 Spreadsheet

Thanks to improvements in usability, Athena Design's newest version of Mesa could become the most popular native OS/2 spreadsheet. In 2.0.4, Athena has fixed some feature gaps that made for inconveniences in the software's last version, such as a lack of in-cell editing, huge tabs on the right side of the workbook, and a lack of keyboard navigation. **Mesa for OS/2 2.0.4** has text boxes for unlimited annotation of cells and graphs. Also, you can now import Lotus .wk4, Quattro Pro .wb1, and Excel 3.0 and 4.0 .xls files. The Selection Manager lets you change display attributes, sort and search for cell contents, and modify graphs. The company says that performance is also better. Best of all, at a list price of $199, Mesa for OS/2 version 2.0.4 is a spreadsheet bargain. Athena Design, 800/315-6372, 617/426-6372.

Reader service no. 644

Avoid Virus Outbreaks

When you download intriguing files from the Internet or an online service, you don't want to be struck by a virus. **PC-cillin 95** from TouchStone Software aims to protect Windows 95 users by automatically scanning files and UUencoded messages (binary files converted to text that looks garbled) for viruses. The program also scans compressed files and performs more conventional virus detection. PC-cillin 95 scans programs before they are launched and checks floppy disk boot sectors when the disk is accessed. You can also scan manually. List price is $49.95. TouchStone Software, 800/531-0450, 714/969-7746.

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Improve Serial Port Speed

A fast new external modem does you no good if your PC's serial port is slow. But there's an easy solution. The **Softport and Softport+** cards update your PC's serial port capabilities. Normally, you have to set jumpers manually on an I/O card, but Softport lets you set up using DOS software. The Softport card offers a 16550a UART, a 460-kbps maximum transfer rate, and a 16-byte buffer. The Softport+ is Plug and Play compliant, so if your PC has a Plug and Play BIOS and Windows 95, the PC will set up the new port for you. Softport+ is available with a 16650 UART, a 512-kbps maximum transfer rate, and a 32-byte buffer—enough to handle any of today's high-speed modems. Street price is $35 for Softport, $45 for Softport+. Axxon Computer, 800/361-1913.

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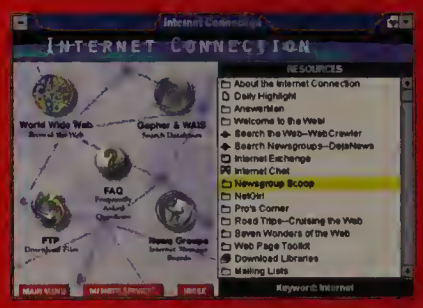

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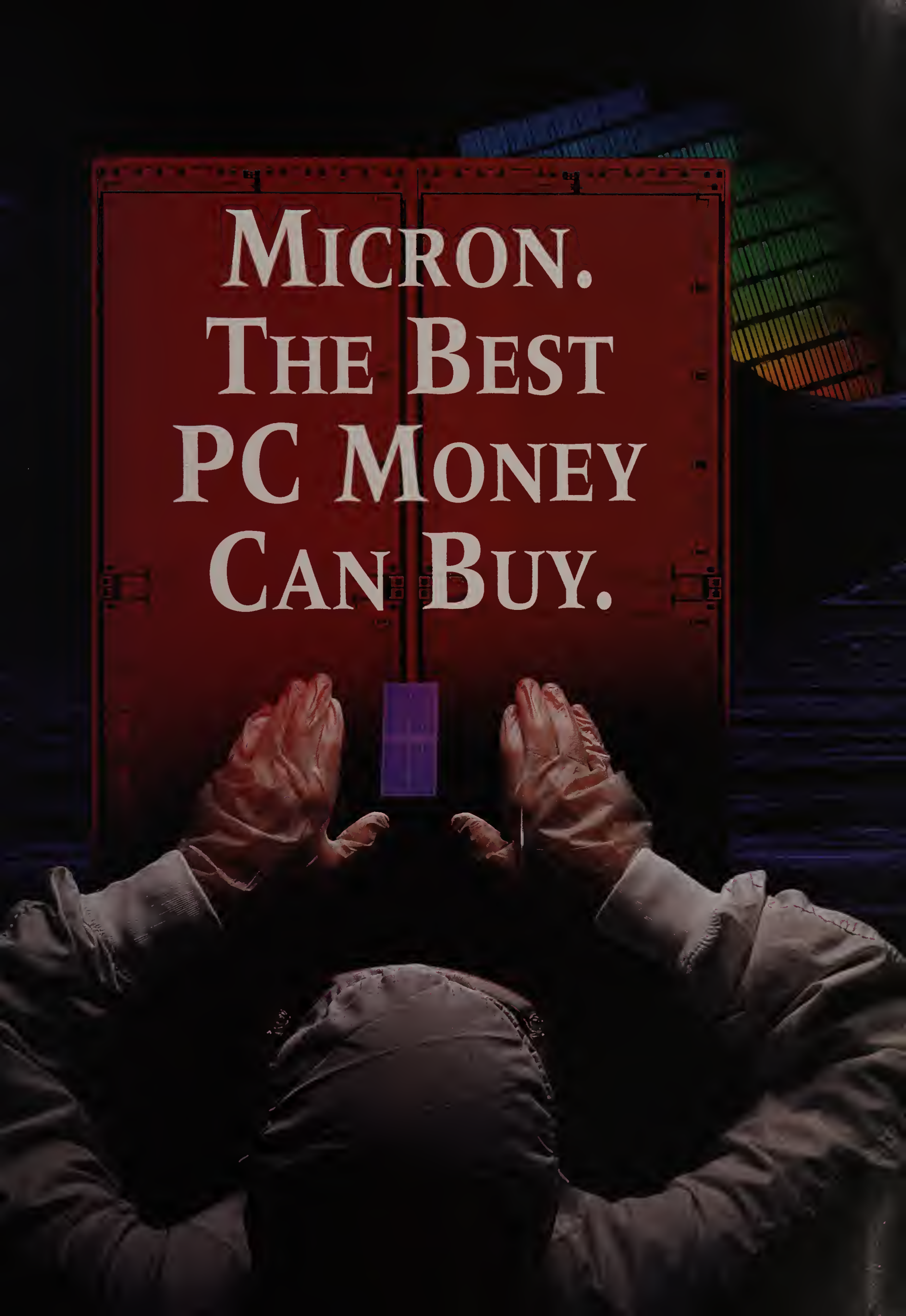
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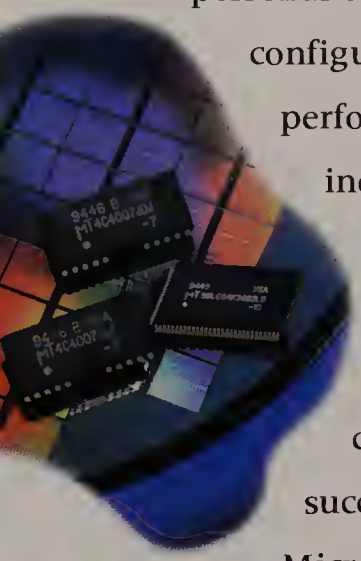

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PC MAGAZINE EDITORS' CHOICE
May 30, 1995
P120 MILLENNIA

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P133 MILLENNIA

December, 1995
P133 MILLENNIA

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- 256K pipelined burst cache, flash BIOS
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- PCI 64-bit video, MPEG, 2MB EDO
- *Tool-free* mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs

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• 15" Micron 15FGx, 1280NI, .28mm monitor
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B • 32MB EDO RAM • 2GB Fast SCSI-2 hard drive
• 15" Micron 15FGx, 1280NI, .28mm monitor
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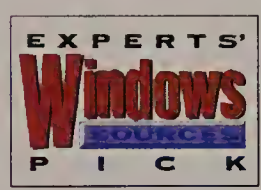

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intel inside
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- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT Workstation 3.51 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs

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B • 64MB RAM • 4GB Fast SCSI-2 hard drive
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$7,399 Business lease $274/month

C • 128MB RAM • 9GB Fast SCSI-2 hard drive
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PC MAGAZ EDITO CHOI
May 30, 19
P120 MILLE

ANYTHING LESS?

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- SoundBlaster™ 16 stereo sound & speakers
- PCI 64-bit video, MPEG, 2MB EDO
- *Tool-free* mini-tower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 CD

December, 1995
P133 MILLENNIA

A • 8MB EDO RAM • 850MB EIDE hard drive
- 15" Micron 15FGx, 1280NI, .28mm monitor
- Microsoft Works 95 CD

$2,399 Business lease $86/month

B • 16MB EDO RAM • 1.2GB EIDE hard drive
- 15" Micron 15FGx, 1280NI, .28mm monitor
- Microsoft Office Pro 95 & Bookshelf 95 CDs

$2,799 Business lease $100/month

C • 32MB EDO RAM • 1.6GB EIDE hard drive
- 17" Micron 17FGx, 1280NI, .26mm monitor
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- With 100MHz Pentium processor.....subtract $200

150MHz and 166MHz Pentium processors available.

P133 MILLENNIA PLUS

- Intel 133MHz Pentium processor
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- PCI 32-bit Ultra SCSI Fast-20 controller
- 6X SCSI-2 CD-ROM drive, 3.5" floppy drive
- SoundBlaster 16 stereo sound & speakers
- PCI 64-bit video, MPEG, 2MB EDO
- *Tool-free* mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs

A • 16MB EDO RAM • 1GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, 1280NI, .28mm monitor

$3,199 Business lease $109/month

B • 32MB EDO RAM • 2GB Fast SCSI-2 hard drive
- 15" Micron 15FGx, 1280NI, .28mm monitor

$4,199 Business lease $143/month

C • 64MB EDO RAM • 4GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, 1280NI, .26mm monitor

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Exceptional speed, performance and reliability are just a few of the reasons why Micron is a technology leader in PC design. From the powerful and award-winning PowerStation, to the P266 PowerServer SMP, Micron offers a complete range of dependable products to suit every need. So when you're considering your next PC purchase, consider how much you'll get in a Micron PC.

P100 POWERSTATION

- Intel 100MHz Pentium processor
- 256K write-back cache, flash BIOS
- 4X EIDE CD-ROM drive, 3.5" floppy drive
- SoundBlaster 16 stereo sound & speakers
- PCI 64-bit video, MPEG, 2MB EDO
- *Tool-free* mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 CD

A • 8MB EDO RAM • 850MB EIDE hard drive
- 15" Micron 15FGx, 1280NI, .28mm monitor
- Microsoft Works 95 CD

$1,999 Business lease $71/month

B • 16MB EDO RAM • 1.2GB EIDE hard drive
- 15" Micron 15FGx, 1280NI, .28mm monitor
- Microsoft Office Pro 95 & Bookshelf 95 CDs

$2,399 Business lease $86/month

- With 75MHz Pentium processor....subtract $100

P75 POWERSTATION LX

- Intel 75MHz Pentium processor
- 256K write-back cache, flash BIOS
- 8MB EDO RAM • 850MB EIDE hard drive
- 3.5" floppy drive
- PCI 64-bit graphics accelerator (1MB)
- 14" Micron 14FGx, 1024, .28mm monitor
- *Tool-free* mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95
- Microsoft Works 95

$1,499 Business lease $54/month

- With 100MHz Pentium processor.....add $100

P133 PowerServer SMP

- Intel 133MHz Pentium® processor
- Dual Pentium SMP ZIF sockets
- 512K write-back cache, flash BIOS
- Slots: 5 EISA, 2 PCI, 1 EISA/PCI
- PCI 32-bit Ultra SCSI Fast-20 controller
- 4X SCSI-2 CD-ROM drive, 3.5" floppy drive
- PCI 64-bit video, MPEG, 2MB EDO
- Full-size tower with 10 drive bays
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 CD

A • 16MB RAM • 1GB SCSI-2 hard drive
• 15" Micron 15FGx, 1280NI, .28mm monitor
$3,599 Business lease $123/month

B • 32MB RAM • 2GB SCSI-2 hard drive
• 15" Micron 15FGx, 1280NI, .28mm monitor
$4,599 Business lease $157/month

- With second 133MHz Pentium processor.....add $799
- With Windows NT Workstation 3.51 CD.....add $249

P266 PowerServer SMP

- Dual 133MHz Pentium processors
- 512K write-back cache, flash BIOS
- Slots: 5 EISA, 2 PCI, 1 EISA/PCI
- PCI 32-bit Ultra SCSI Fast-20 controller
- 6X SCSI-2 CD-ROM drive, 3.5" floppy drive
- PCI 64-bit video, MPEG, 2MB EDO
- Full-size tower with 10 drive bays
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT Workstation 3.51 CD

Microsoft Windows NT Ready-to-Run

A • 32MB RAM • 2GB SCSI-2 hard drive
• 15" Micron 15FGx, 1280NI, .28mm monitor
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B • 64MB RAM • 4GB SCSI-2 hard drive
• 17" Micron 17FGx, 1280NI, .26mm monitor
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intel inside pentium processor

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- PCI 64-bit video, MPEG, 2MB EDO
- 15" Micron 15FGx, 1280NI, .28mm monitor
- *Tool-free* mini-tower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 CD
- Microsoft Works 95 CD
- *Microsoft Scenes: Sports Extremes; Microsoft Bob™ CD; Microsoft Encarta 95 CD; Quicken® Deluxe Edition CD; Microsoft Dangerous Creatures CD; Microsoft Golf Multimedia CD; Trial subscriptions for Compuserve™, Prodigy™ and America On-Line™.*

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- With 100MHz Pentium processor.....add $100

PC MAGAZINE EDITORS' CHOICE
May 16, 1995
P90 HOME MPC

PC WORLD WORLD CLASS 1995
July 1995
P90 HOME MPC

intel inside pentium PROCESSOR

P133 HOME MPC PRO

- Intel 133MHz Pentium processor
- 256K pipelined burst cache, flash BIOS
- 16MB EDO RAM • 1.2GB EIDE hard drive
- 6X EIDE CD-ROM drive, 3.5" floppy drive
- SoundBlaster 16 stereo sound & speakers
- 28.8 fax/modem, speakerphone, voice mail
- PCI 64-bit video, MPEG, 2MB EDO
- 17" Micron 17FGx, 1280NI, .26mm monitor
- *Tool-free* mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs
- *Microsoft Scenes: Sports Extremes; Microsoft Bob CD; Microsoft Encarta 95 CD; Quicken Deluxe Edition CD; Microsoft Dangerous Creatures CD; Microsoft Golf Multimedia CD; Trial subscriptions for Compuserve, Prodigy and America On-Line.*

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SPECIAL REPORT

Workgroup Computing

GET THE NET RESOURCES YOU NEED

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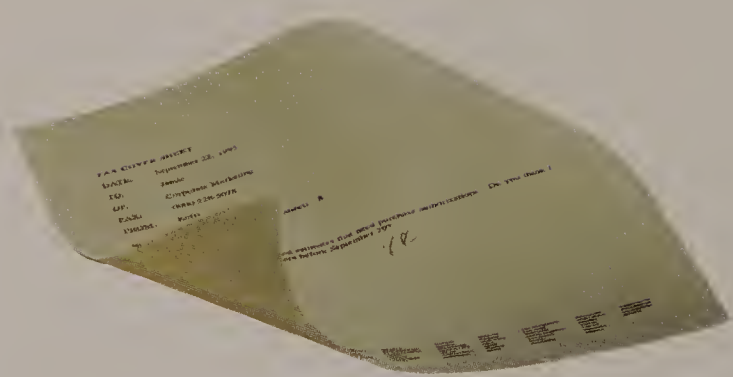
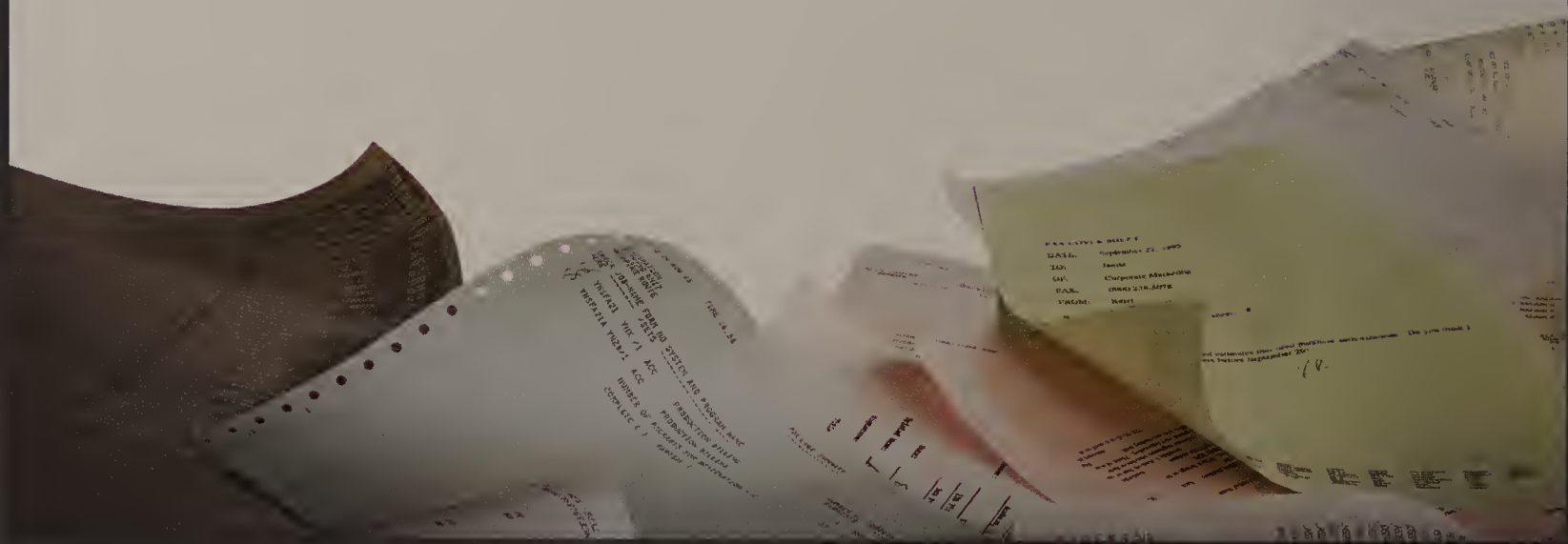
Office.IQ Handles Your Routines
128 Software speeds shared tasks.

Edited by Eric Bender

ILLUSTRATION BY BORIS LYUBNER

You asked for every fax,
every document,
every report,
every last scrap of data
you've ever needed.



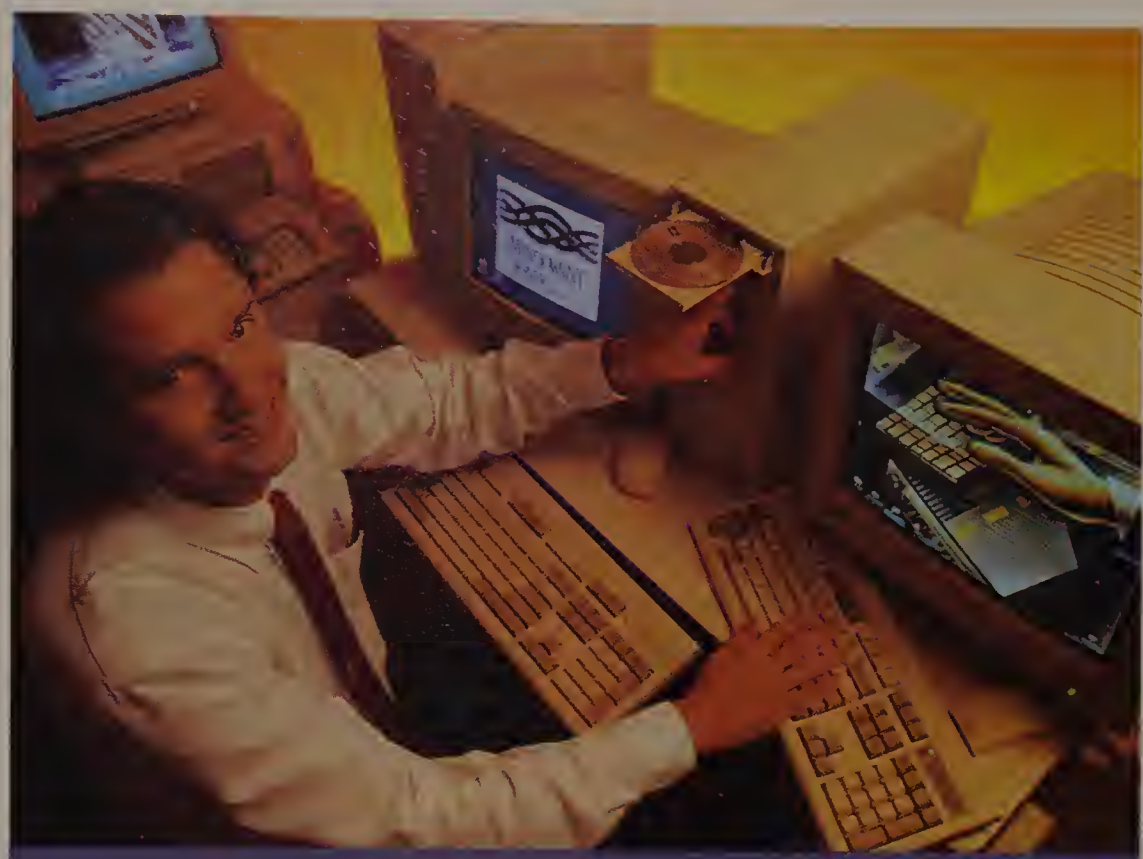


Launching Our Server Lab

PC World opens a center dedicated to rigorous Top 10 reviews of network servers

You take a deep breath before ordering a network server. It's the centerpiece of your PC network, and a wrong choice could haunt you and your colleagues for a long time. You've got a host of tough decisions about networking hardware and software components, all piled on top of the complexities of a high-end PC purchase. And it's the most expensive kind of computer that most of us ever buy.

PC World has kicked off a project to ease your buying decisions with regular Top 10 reviews of servers. A joint venture with our sibling publication *Network World*, this will bring to servers for the first time the rigorous comparative testing that has made our Top 10 and 20 reviews so popular with readers. We'll look at performance, features, service and support, and pricing for both workgroup and enterprise servers—and we'll highlight what you really need to consider when buying a network server.



TEST CENTER DIRECTOR William L. Rinko-Gay has created real-world benchmarks for testing servers.

For this effort, we're opening the new Network World/PC World Network Test Center in Spring, Texas. It's under the supervision of lab director William L. Rinko-Gay, who formerly ran Compaq's Desktop Competitive Analysis Lab and was reviews editor for *Personal Workstation Magazine*.

How Fast Is the Service Here?

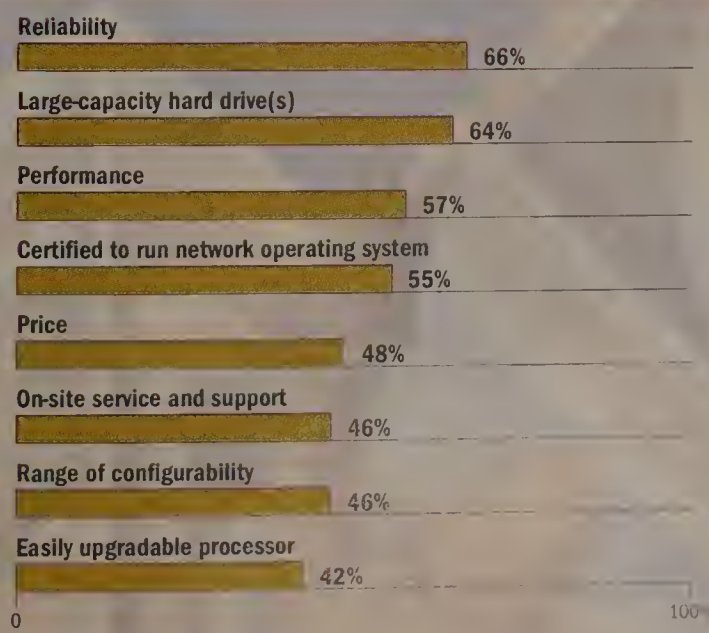
"Our performance testing focuses on real-world applications that determine how well the servers perform in common roles as file servers, SQL database servers, and Lotus Notes servers," Rinko-Gay explains. "We didn't create synthetic benchmarks that don't match up with real experiences."

For the workgroup file server tests, we run popular Windows 3.*x* and Windows 95 applications on client PCs, open and save files, import objects, import clip art, and perform other everyday tasks. When testing enterprise database servers, we set up an Oracle database engine on the server and measure response rates when entering data in simple workgroup databases and in complex decision support databases typical of those run on enterprise servers. To test Lotus Notes servers, we put a program based on Lotus's customer support sample application through its paces.

The servers run both NetWare 4.1 and Windows NT Advanced Server 3.51. We bang on them with up to 16 clients to emulate workgroup usage, and up to 64 simulat-

WHAT BUYERS WANT IN PC SERVERS

Among *PC World* readers who are buying servers, reliability and hard drive storage capacity are the most important concerns, according to the 1995 PC World Network Study. Slightly less than half of the surveyed readers rank server pricing as extremely important. Half of employed *PC World* subscribers are involved with buying servers.



ed clients to test enterprise usage. Fast Ethernet adapters and switches/intelligent network hubs keep the data pumping at full speed. "We're stressing the servers as much as you would in your worst situations, and we're avoiding any of the test bottlenecks that might keep the power of the servers from shining through," says Rinko-Gay.

Our tests focus on real-world applications that show how well these systems function as file and application servers.

To simulate extra clients, we use the multitasking power of Windows 95 to create up to four users on one PC. We've adapted our desktop benchmarks to run side by side with each other, using each application's scripting language, with each client's tests running in different order. This gives a realistic picture of multiple network users.

We had to be careful with such issues as how many clients should be sharing the same copy of the application software. Too many clients, and the impact of the server's cache memory is artificially high. Too few clients, and it's artificially low. Our workgroup test uses one copy of each application, stored on the server. Our enterprise model has four smaller segments connected to our overall network, so each segment shares a copy of the application.

Enterprise servers must offer plenty of power—in the CPU and storage subsystems and in the handling of multiple peripherals simultaneously. Multiple network adapters and the storage subsystems all compete for this resource. We load 64 simulated clients through four separate adapters to test which servers handle this competition well, and which get bogged down by poor bus design.

Getting the Service You Need

Our two Top 5 Server rankings—one for workgroup servers, one for enterprise servers—will also take into consideration price, reliability, service and support, expandability, software bundles, and ease of setup and administration.

Today's PC servers cover an extremely broad spectrum of capabilities, and prices vary accordingly. You can pay well under $10,000 for a basic workgroup server, or many times that for a multiprocessing server designed to run mission-critical applications and go down only one hour per year.

For any server, reliability and technical support are key concerns, and they can't be judged accurately in a feature-by-feature checklist. What's important is how the entire system is built and integrated, and what kind of help you can expect when trouble rears its head. We're interested in hearing about your experiences, good and bad.

Right now we're running dozens of machines through the lab, and the first results will appear in the next Workgroup Computing section. They'll provide reliable, detailed information to help you buy a system that will serve you right.

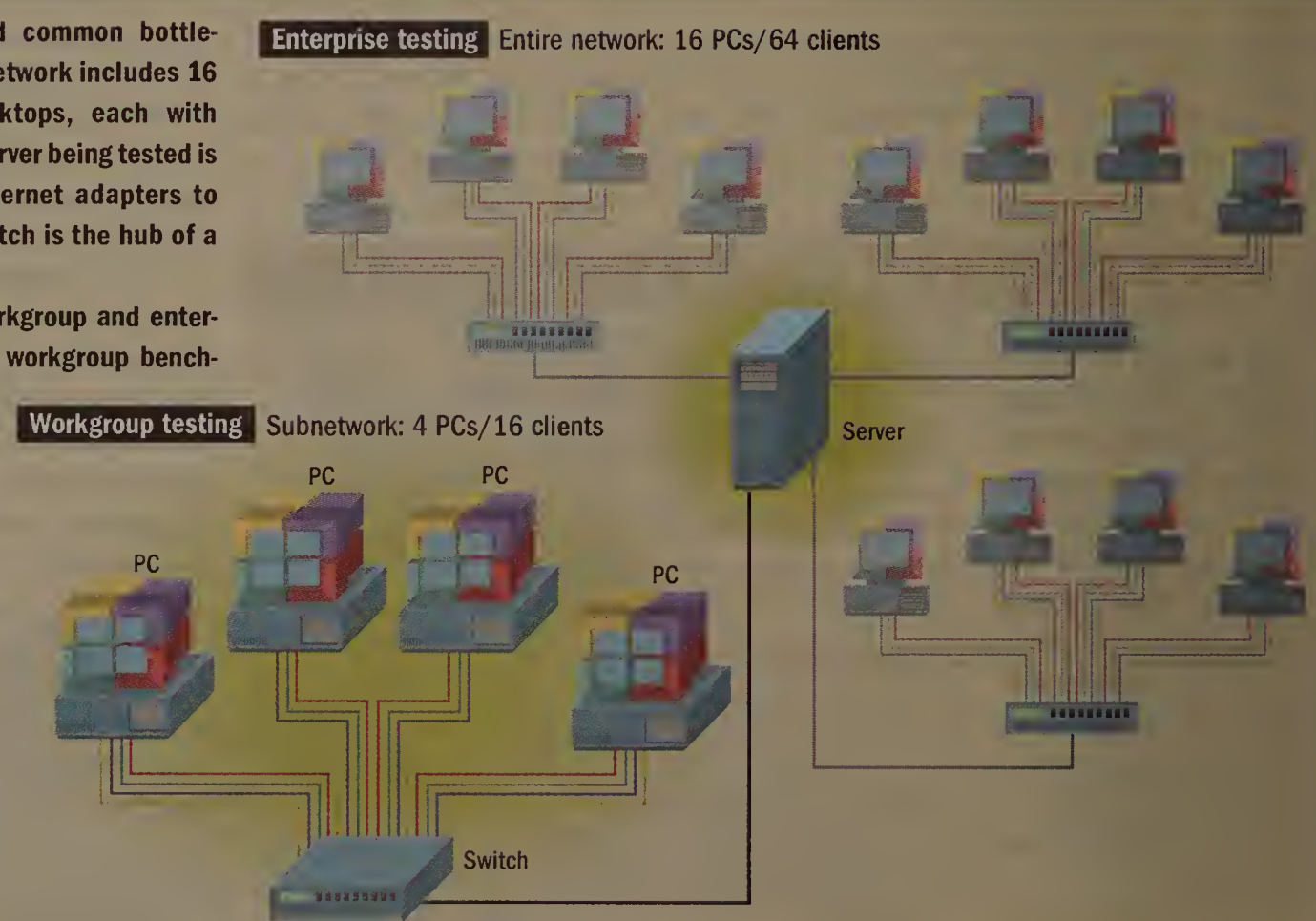
—Eric Bender

Eric Bender is a PC World *executive editor. Send suggestions for the Top 10 Server tests to him at eric_bender@pcworld.com.*

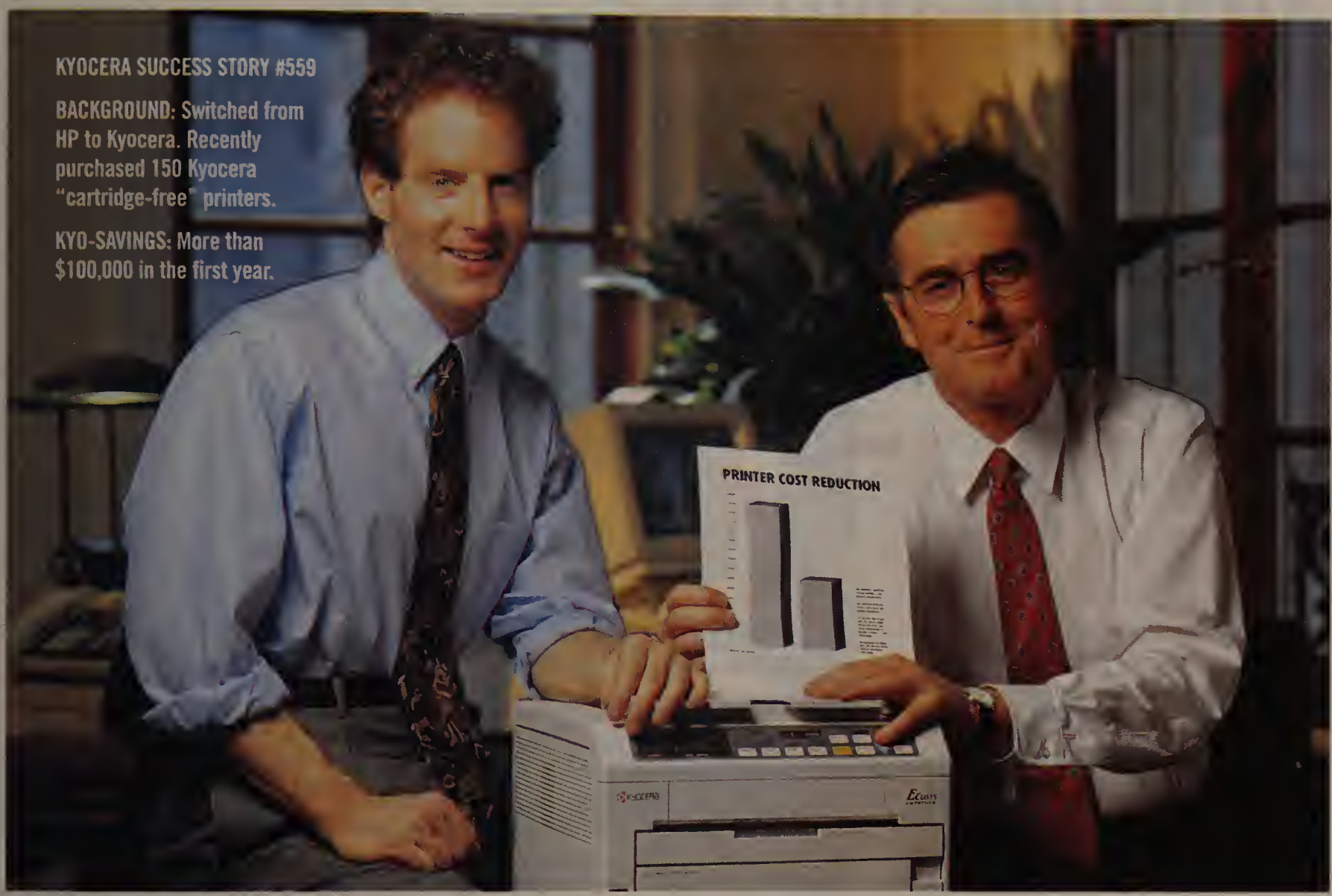
OUR TEST NETWORK FOR SERVER PERFORMANCE

Designed to avoid common bottlenecks, our test network includes 16 100-MHz Pentium desktops, each with 16MB of memory. The server being tested is connected via Fast Ethernet adapters to four switches. Each switch is the hub of a subnetwork of four PCs.

We test servers in workgroup and enterprise roles. We run our workgroup benchmarks on one of the subnetworks. We use tests from the *PC World* Top 20 desktop benchmark that focus primarily on file service, plus tests with Oracle and Lotus Notes databases. We perform enterprise tests on the entire network, running much more demanding database tasks.



YOU'D SMILE TOO IF YOU JUST CUT YOUR NETWORK PRINTER COSTS IN HALF.



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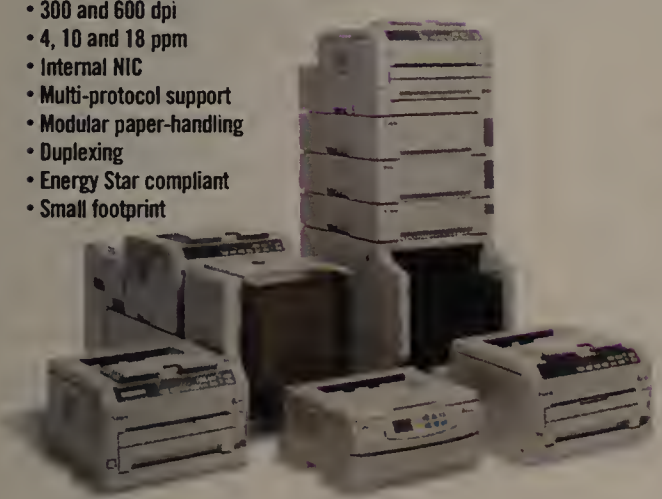

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Circle 127 on reader service card

NETWORK SERVERS

Reliably Yours

PC servers pack a full bag of tricks to boost reliability.

Take a high-end desktop PC, stuff it with a network operating system, a big hard disk, and a network adapter, put it on its side in a closet, and *voilà!* Perfect network server, right?

Wrong. Unless you have a tiny network, you're better off buying a server built from the ground up for that role. For a relatively small premium over the cost of a desktop computer, you get better performance, greater upgradability, easier administration, and most important, higher reliability.

Reliability is the most crucial concern in network operation, and this concern is growing daily as more data and services flow over the network.

You probably remember well the last time your local server went down and stayed that way, because the result was that your group lost basic computer rights such as printing and access to important files.

And increasingly, servers don't just handle files and printouts. They run central databases and other applications, handle your mail, link up every flavor of shared peripheral, and connect you to your organization's wide area network, the Internet, and the rest of the outside world.

That means servers must offer features to minimize downtime and handle problems gracefully; or—if you're willing to pony up serious money—they must never fail at all. They should offer tools for detecting and fixing problems promptly. And they're probably the worst place to cut corners in your budget. Here's a quick tour of what today's servers offer for reliable network operation.

Built for Service

Expect to spend $5000 and up—way, way up—on today's specialized PC servers. But even at the low end of this range, you can get enhanced reliability features once found only in mainframes and minicomputers.

Take, for example, one departmental server, Compaq's ProLiant 1500 5/133. At press time, its list pricing started at around $7000, with a 133-MHz Pentium, 32MB of memory and a 512K secondary cache, 2 PCI slots, 5 EISA slots, one shared EISA/PCI slot, a Fast and Wide SCSI-2 adapter, a 1GB hard drive, and a CD-ROM drive.

Just your generic high-end PC? Not quite. These components are not all as vanilla as they sound. This configuration includes special high-reliability memory chips, as well as custom software tailored for installing and administering network operating systems; built-in security features; a built-in high-performance network adapter; and better technical support and on-site repair programs than you get with typical desktops. These are no small points when 20 or 200 users are scratching their heads wondering what happened to their e-mail.

Additionally, you can enjoy a wealth of hardware options that desktop PCs lack—everything from a second CPU to hard disks that can be swapped out without bringing down the machine to a plug-in card that lets you monitor and even reboot the machine from somewhere else.

A Little Installation Assistance

It's all too common for servers to be installed incorrectly, creating subtle problems that later come back and bite you big-time. But even entry-level servers now bundle software tools that help a network administrator install them the right way right out of the box, saving major hassles down the road.

Hewlett-Packard's Configuration Assistant, for example, offers online guidance during the installation process and provides a graphical summary of the server's configuration, including items like expansion slots and configured cards. The Assistant also makes recommendations for installing the network operating system and creates a disk that contains all necessary drivers.

Compaq's SmartStart takes the concept one step further by adding actual network operating systems and database software tools to its ProLiant server installation, as well as optimizing the software programs for the server hardware. (This is part of a trend to sell servers bundled with software tailored for a given role, such as a bundle for a World Wide Web server.)

Many vendors provide such installation benefits, but only for specific models. Check with the vendor to make sure you get what you need.

Watching the Server Run

PC servers also typically show up with server-monitoring suites, which automate some of the tasks that a harried network administrator might skip, and sound a warning before situations get out of hand (for example, when a disk starts to get dangerously full). Again, these tools are customized for particular product lines; if they're not bundled, you can usually purchase them separately starting at around $350.

One example is IBM's NetFinity, which comes free on most of the company's PC servers and provides a wealth of services for servers (and any attached workstations that also run the package). It monitors hardware performance and the status of key components such as memory and disk drives, and it can even predict upcoming disk failures. It offers diagnostic tools, keeps up-to-date inventories of hardware and software, alerts administrators of problems, and lets them fix those problems from a remote location—a very big deal.

Vendors are continually looking to make servers easier to manage. For example, Compaq and HP servers can automatically reboot after a software crash. (Software problems typically bring down servers more often than hardware failures.) These software tools may only thrill net administrators, but life can get pretty exciting without them.

Driving On and On and On

On the hardware side, PC servers need a big, fast, reliable disk drive system. This is the server's only major component that has moving parts—which are much more likely to fail than solid-state electronic parts, and therefore get more serious attention from server designers.

All but the smallest servers include multiple disks, and three approaches boost reliability: *disk mirroring*, *disk duplexing*, and—at the very high end—*Redundant Array of Inexpensive Disks*.

Even entry-level servers bundle software tools that help you install them the right way, saving you major hassles down the road.

When two drives (or two sets of drives) share a disk controller and are maintained as identical copies of each other, they're called *mirrored drives*. If the primary drive or drives fail, the secondary drive or drives carry on with no interruption of service—as long as the failure isn't in the disk controller. Mirroring requires twice the amount of disk space and thus twice the cost for drives.

Duplexed drives add a separate disk controller for each mirrored drive, which provides higher reliability at higher cost. (However, there's no performance penalty.)

RAID is an umbrella term for several methods of distributing data evenly across an array of disk drives; it typically appears on high-end servers with more than 4GB of storage. When such systems lose a drive, they can serve up the missing data as if the drive were still there, with a small performance penalty. When the drive is replaced, it is reconstructed and the server continues as if nothing had happened. RAID can be configured in at least five ways, each offering a different combination of performance, redundancy, and price. You pay plenty for the extra disks and high-end controllers.

You may also choose to pay extra for *hot-swappable* drives, which you can replace while the server stays up. (Of course, this means making arrangements for spares beforehand so you've got the drives to swap when you need them.) Typically, hot-swappable drives require a special RAID controller and external boxlike unit that houses the drives. For 7GB of hot-swappable drives and accompanying hardware, expect to pay anywhere from $9000 to $11,000.

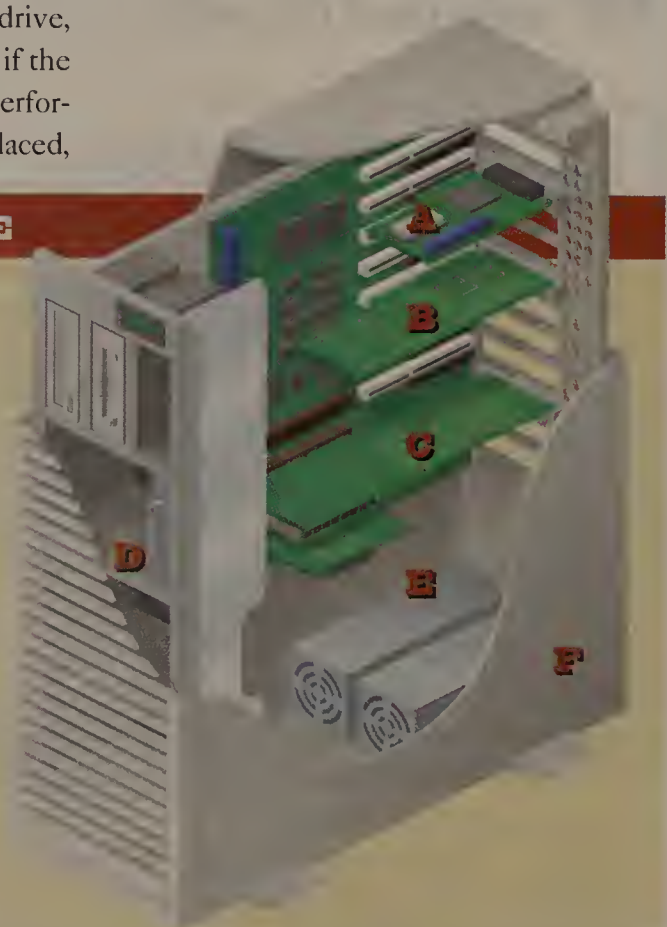
Remotely Available

When a network goes down and there's no net administrator on the scene, it's mighty handy if they can dial directly in to your server from another location and attempt to restart it. This option is becoming common. For instance, HP sells a $999 Remote Assis-

BUILT FOR SERVICE

Top-of-the-line network servers provide a host of hardware features to boost reliability and performance. Here are average street prices for selected options.

A	Fast and Wide PCI SCSI-2 RAID controller	$600
	Fast and Wide PC SCSI-2 hot-swappable RAID controller	$2125
B	Remote management module	$900
C	Memory, per 16MB ECC SIMM	$825
D	1GB Fast SCSI hot-swappable drive	$800
	4GB Fast and Wide hot-swappable drive	$3000
E	Single power supply	$400
	Dual power supply	$1000
F	Extra-large case	$150



tant Card that includes an on-board processor, battery backup, and modem. An administrator can dial directly in to that board and read diagnostic information, or test or reboot a server that's still functioning.

If you're in a branch office or other relatively small group that lacks an on-site network administrator, but you can call headquarters or a reseller who's contracted for technical help, make sure you buy a server with such an option.

Most also can automatically page your support provider whenever certain failures occur—again, no small point.

Uninterruptedly Yours

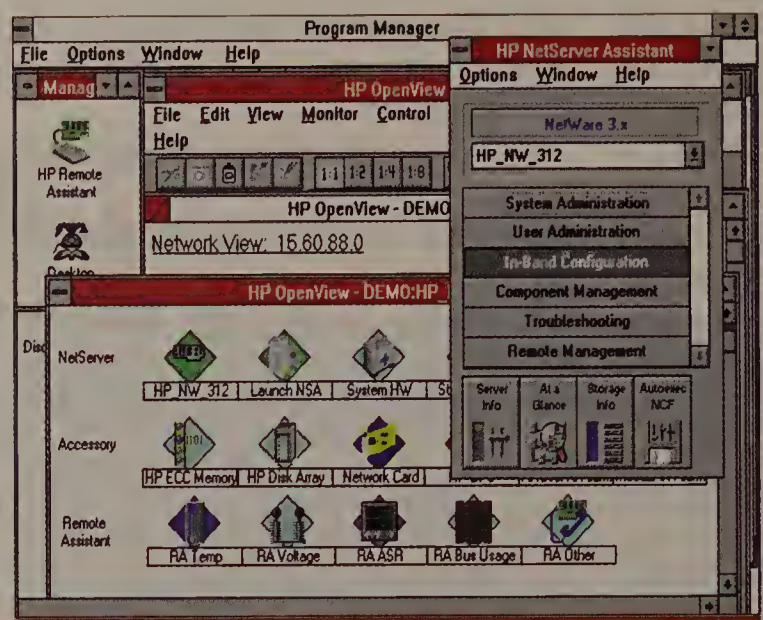
Every server should be outfitted with an uninterruptable power source, which provides an alternate source of power should the regular building power fluctuate or stop. You buy this backup power source separately from the server, but you want the two to play together well.

You can tie the UPS system into your file server so that it sends a message to notify your users how much longer the server will stay up, and then shuts down your server automatically and gracefully. Some vendors sell add-on software utilities for $50 to $200 that provide these services, and some UPS vendors bundle software with the hardware.

Other hardware options that can be built into the server are aimed at organizations with high-end needs for networks that cannot go down:

• *Hardware That Fixes Its Own Bad Self:* A common option on high-end servers, special memory chips monitor and alert the administrator when a chip needs replacing. These Error Correcting Code memory chips can automatically correct themselves if the errors are small enough—a big plus in servers, which can crash when a memory chip goes bad. Additionally, ECC memory tells you exactly which chip is bad.

Expect to pay about a 50 percent premium for ECC memory (for instance, $825 rather than $550 for 16MB).



IF IT AIN'T BROKEN (YET), FIX IT: A sophisticated management tool such as HP's NetServer Assistant lets administrators keep an eye on the network and alerts them to potential problems.

• *Overcoming Power Struggles:* Some servers house two power supplies to protect against a single failure. In such systems, the two power supplies work together so that if one stops working, the second takes over. This usually gives a system administrator time to repair the defective power supply before the other one can fail.

Dual power supplies come in two flavors: *hot standby* and *load-balancing*. In a hot standby setup, one power supply handles all the power for the system and the second supply kicks in if the first one fails. With load balancing, each power supply operates at half capacity, and if one fails, the other goes up to full capacity.

Chances are that you'll have to go with whatever option your system vendor offers; IBM and some other vendors plan to offer dual supplies as standard for some of their server models.

No-Fault Insurance for Servers: In the most extreme case, when your system absolutely can't go down, server mirroring adds the top level of redundancy.

In this approach, two servers communicate via a special high-speed link, whereby all data and memory on server A are mirrored onto server B. If server A goes down, server B immediately takes over without any intervention by the administrator and without users noticing any downtime.

NetWare's System Fault Tolerance, the leader in server mirroring, is an expensive approach: It requires two highly similar servers and its software carries more than twice the usual price tag. Several less expensive alternatives bring up the second server in minutes rather than almost instantaneously.

Not surprisingly, most of the current customers for specialized PC servers are large groups who just can't work without a safety net, like organizations that play a critical role within nuclear power plants and hospitals, for example.

But the technology now also appeals to a growing list of organizations who keep their operations running 24 hours a day: Internet service providers; corporations with many traveling salespeople who may dial in from the road at any hour; and even small mail-order companies that depend on their server around the clock. These firms, like others, keep looking for servers that never let you down.

—Mary Madden and Ed Tittel

When a network crashes and no administrator is on the scene, it's handy if they can dial directly in to your server.

Mary Madden and Ed Tittel are freelance writers and network consultants based in Austin, Texas, and coauthors of The PC Network Handbook *(AP Professional, 1995, 800/313-1277).*

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Windows?

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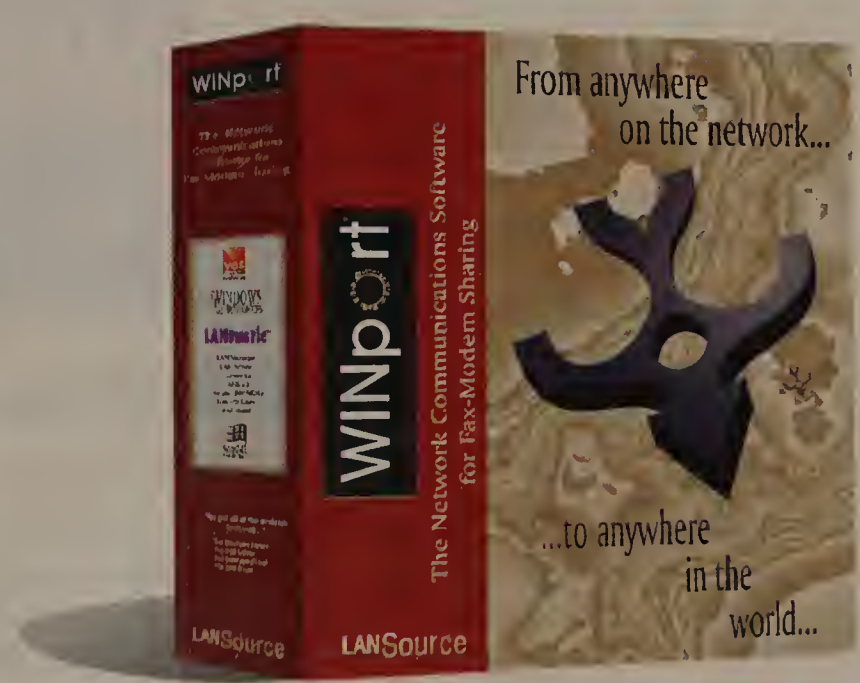

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GROUP PROBLEMS, GROUP SOLUTIONS

Do Meetings Clog Your Day?

Attorney Bill Wright describes how conferencing software improved his law firm's communications.

Our Bellmawr, New Jersey law office houses 40 people—6 attorneys, 12 paralegals, and 22 support staff. Farr, Burke, Gambacorta & Wright isn't large enough to employ a full-time MIS director, so my partners and I share that role, maintaining 20 PCs on a DEC Pathworks network and a VAX minicomputer. Until about a year ago, the closest we came to groupware, aside from DEC Mail e-mail, was a conference room and a whiteboard.

Then, in September 1994, one of the firm's partners unexpectedly resigned, taking 3 associates, 3 paralegals, 11 support staff, and dozens of clients' files with him. Four days later, he had the audacity to sue us. We promptly filed a counterclaim.

So, in addition to being left short-staffed, we had to deal with a lawsuit. Keeping everyone up-to-date on developments in the case meant impromptu meetings, quick hallway confabs, and a flurry of e-mail. The rest of the time we were in each others' offices commiserating. (There's nothing like a common foe to bring colleagues together.) We spent so much time telling each other what we were doing that we had little time to actually do anything.

Obviously we needed a way to distribute our information more efficiently. E-mail discussions were better than offline meetings, but they were difficult to track. Crucial information was easily lost among all the replies. On the other hand, we didn't have the resources or the time for an expensive and complicated client/server application like Lotus Notes.

While looking for a solution between these two extremes, I read a review of several conferencing packages and was struck by the description of Trax Softworks' TeamTalk. It had everything we needed—threaded discussions within topics, cross-topic searching, and easy installation—at a relatively low price. And it would run on our existing PCs. We bought it, installed it, and started using it immediately to help in the litigation with our former partner.

TeamTalk paid for itself in a week. We could get more information reading a TeamTalk discussion for 5 to 10 minutes than meeting in the conference room for 2 hours. We now spend less time in meetings and more time in billable work.

BILL WRIGHT can now share company information more quickly.

Instead of calling a meeting to apprise colleagues of new developments in a case, I find the appropriate discussion in TeamTalk, add a comment or reply, then click Send to notify everyone in the group. We still have meetings, but they're much more focused. Participants review the online discussions beforehand and come to the meeting ready to get down to business.

We get more information reading a TeamTalk discussion for 10 minutes than meeting in the conference room for 2 hours.

What started as one discussion on the suit and countersuit with our former partner has grown into 32 discussions covering every part of the firm's operations, from legal procedures to marketing to warehousing information for an attorney on leave.

TeamTalk cuts down on information overload by letting us specify membership for each discussion. TeamTalk also lets us assign varying levels of participation, letting certain members follow a discussion but not add comments or replies to it.

The Management discussion, which disseminates confidential information about managing the firm's business, is limited to the four shareholders. But discussions about the firm's clients and about competing firms are open to everyone in the office.

In the Procedure and Law discussion, attorneys and paralegals share information about the law, courtroom strategies, and par-

ticular judges. In the New Time and Billing discussion, administrative staff discuss plans to upgrade current procedures.

In the most novel use of TeamTalk, one of our attorneys created a topic in which co-workers could store information related to her cases while she was on maternity leave. Before leaving, she placed status reports and task lists in the discussion for those covering for her. While she was on leave, coworkers recorded developments so she would be up to speed when she returned.

Wanted: Better Mail Bonding

Though none of us had any trouble learning TeamTalk, there's still some confusion about when to use TeamTalk and when to send e-mail. Some people broadcast messages via e-mail that should be TeamTalk discussions, and vice versa.

Another problem stems from DEC Mail: Though TeamTalk discussions can be accessed from any MAPI- or VIM-compliant e-mail system, our version of DEC Mail doesn't support those standards. Staff who are only on VAX terminals are left out.

In the near future, we may migrate to Novell's Groupwise, one of the few messaging systems that directly supports both VAX systems and PCs.

For the distant future, we're evaluating a more complete groupware solution that would allow us to exchange information with clients around the country.

Our firm represents large financial institutions—including banks, credit card companies, mortgage firms, and automobile finance companies—many of which use Notes. These clients increasingly expect us to link with their networks so they can send us files and receive up-to-the-minute progress reports electronically. Right now, we're handling this exchange by fax—about 300 per day. It should be easier to accommodate all this in Notes.

Edited by Ann Kremers

Ann Kremers is a PC World *senior associate editor. Do you use groupware applications to collaborate with colleagues or to keep up with your customers? If so, we want to hear from you. We pay $300 for published columns. Send a brief description of your group's problem and solution to* Group Problems, Group Solutions *at ann_kremers@pcworld.com.*

TEAMTALK REVIEWED

TeamTalk Speeds Discussions

You're intrigued by the promises of groupware—fewer meetings, faster communication with remote users and customers, less travel—but you're turned off by the costs of dedicated servers, licensing, and an army of specially trained administrators and developers. There is another way. TeamTalk 2.0 from Trax Softworks delivers online discussions, groupware's most popular feature, without the overhead that attends higher-end packages like Lotus Notes.

TeamTalk demands relatively little in return. It runs on just about any network, and a five-user package costs only $395. If you're computer-savvy, you can get it running without any help. (All you need from the network is a shared directory.)

TeamTalk starts by making an electronic conversation more like the real thing. Its centerpiece is a conversation window in which comments appear chronologically, indicating who said what to whom and when.

Finding your way around is easy. You enter a discussion (called a *topic* in TeamTalk) by double-clicking a door icon or by clicking the Directory icon and selecting the topic from the TopicMap.

When you join a conversation, you'll want to review what's already been said. TeamTalk offers several ways to do this. You can read the comments in chronological order, or view them according to the "threads" they belong to. You can also click on column headings in the ThreadMap window to sort the comments by subject, author name, date, and status (read or unread).

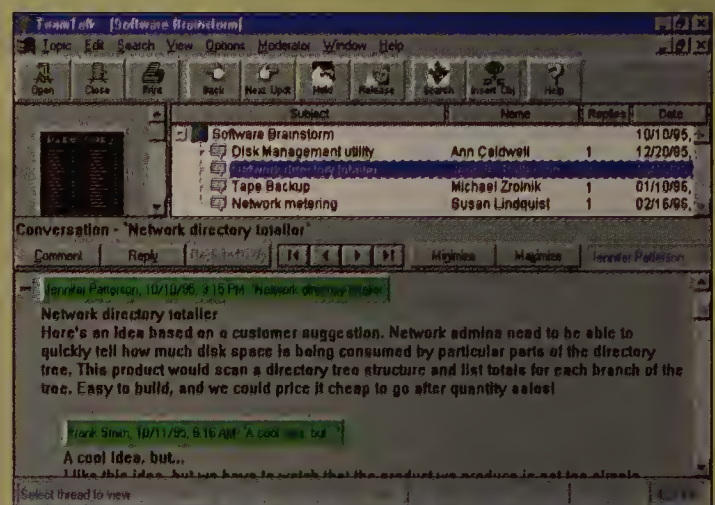
When you need to track down a comment someone made last week or last year, you can use TeamTalk's Search feature to look for words or phrases using Boolean logic.

As soon as you add a comment or reply to the discussion, its members are alerted via e-mail. The moderator of a discussion defines its members and their privileges.

Unfortunately, TeamTalk's built-in text editor doesn't let you format your conversation text with fonts, colors, underlining, boldface, or italics. It does, however, include "stickers"—smiley faces and skulls, for example—that you can paste in for added emphasis. TeamTalk also supports OLE 2.0.

TeamTalk works best at one location on a single server or shared hard disk, but you can broadcast the conversation to another location via e-mail. You also can gab with those who don't have TeamTalk but do use leading e-mail packages. You might need this strategy for mobile users: TeamTalk lacks a dial-up version for remote clients. It does, though, support dial-up remote access via products such as Shiva LanRover.

—Bill Lawrence



VIEW COMMENTS CHRONOLOGICALLY in the conversation window, or sort them by subject, name, date, or status.

Bill Lawrence helps manage a 3000-workstation network for a California utility.

TEAMTALK 2.0

This easy-to-install package is a powerful tool for group discussions.

Trax Softworks Inc.
800/367-8729, 310/649-5800, 310/649-6200 (fax)
info@traxsoft.com

List price: $61 to $79 per user, $395 for a five-user pack

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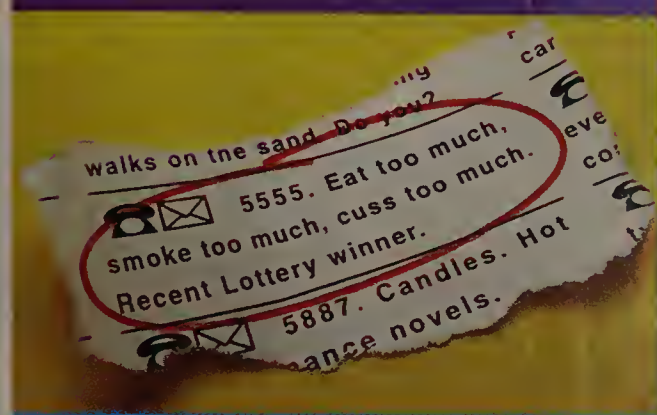
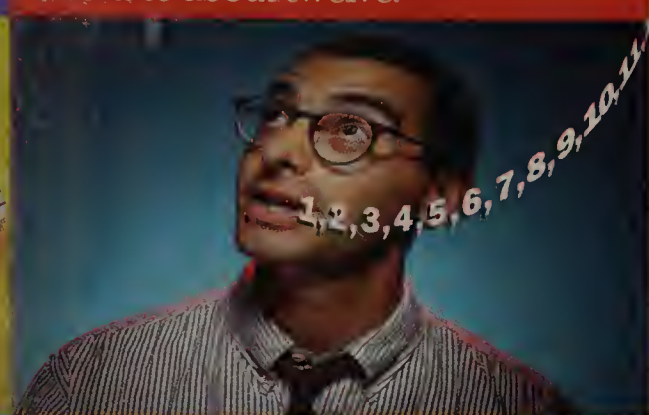


Count to about twelve.



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You should never spend more than 60 seconds answering a question during a job interview. It takes 8 minutes and 20 seconds for a telecast of "Baywatch" to reach the sun. If you're like most Americans, you probably spent close to 30 hours filling out your tax forms last year. You should wait at least 1 hour before investigating a charge of dynamite that didn't go off. You can expect around 2 hours of actual productivity for every 3 overtime hours worked. Today you'll lose between 100 and 200 hairs — unless, of course, you've got nothing to lose. Between 1950 and 1993, mankind produced more goods and services than were produced between 8000 B.C. and 1949.

WORKFLOW SOFTWARE

Office.IQ Handles Your Routines

This entry-level workflow package aids group tasks.

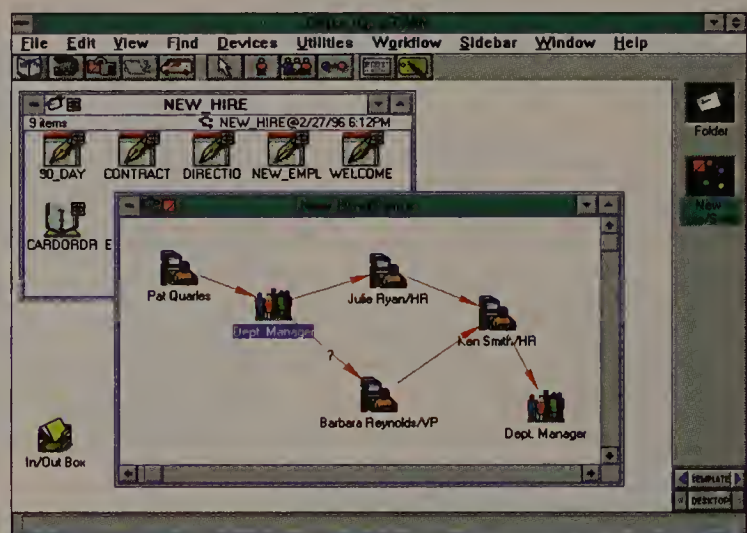
Collaborating on complex projects with other busy people while armed only with e-mail is like shooting pool during an earthquake: You're always aiming at a moving target. The slightest change must be routed and reviewed in an endless procession of easily misplaced electronic files or paper documents.

If these projects follow standard procedures—as they might in hiring, processing customer requests, getting purchase approvals, or developing formal proposals—they cry out for an automatic way to keep everyone updated with a minimum of fuss.

Office.IQ 2.1 is a workflow program that can help you handle such tasks far more quickly, efficiently, and reliably than the usual slow-motion collaboration via paper documents, e-mail, and sneaker-net. In some ways, however, bringing in Office.IQ is like training a new employee: You may need to spend a lot of time working with the newcomer before there's a big payoff.

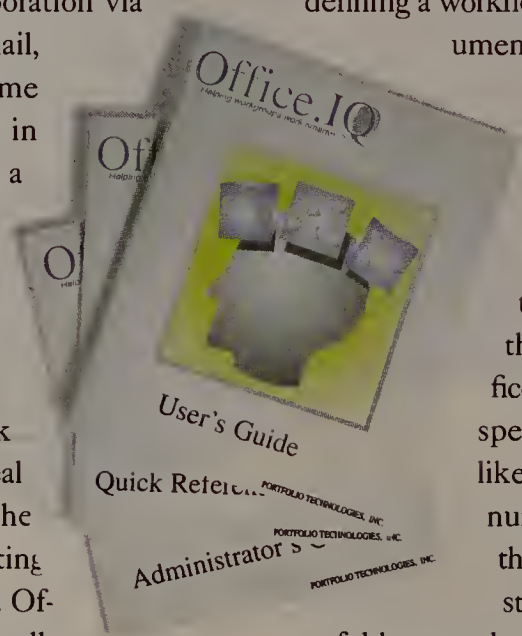
Figuring out how work gets translated from the real world into software is the hardest part of implementing any workflow application. Office.IQ's on-screen help walks you through this process, melding all your files into a streamlined project.

So how does the package actually work? Let's suppose you're hiring a new employee. In the simplest case, you start by importing a file (such as a job position document) into an Office.IQ database. You can now open it from within the Office.IQ desktop with the appropriate application, make changes, and route it to other members of the workgroup (such as your supervisor and Human Resources administrator). Office.IQ handles the routing and makes sure that you're all working on the same version.



OFFICE.IQ STREAMLINES COMMON BUT PROBLEMATIC JOBS such as handling approvals and other paperwork for a new hire.

Okay, handling one document this way is helpful but not overwhelming. Grouping all of a project's documents into folders, then defining a workflow that routes each document to the right set of people, makes the payoffs more dramatic.



You create a project folder by dragging and dropping the folder template displayed on the right side of the Office.IQ desktop. Then you specify project attributes like name and reference number, and drop files into the new folder. Office.IQ starts out with empty folder templates and includes two example folders containing human resources data to illustrate the process.

Making Workflow Work for You

Creating a structured workflow, which forwards the folder's documents from one coworker to the next as tasks are completed, is higher gain and higher pain. You don't need to learn a scripting language to set up a project folder and establish its workflow. Office.IQ's graphical editor lets you set this all up by arranging user icons and defining links between them. But you face a bewildering array of menus, icons, and database objects that will send you to the reference guide more than a few times.

Once you've got the basics down, you can attach rules to workflows that make them more efficient. For example, you can make sure purchases over $1000 get routed to a specific manager.

Only one user can kick off the workflow, but anyone can do ad hoc document routing as needed. A workflow's progress is indicated graphically, with completed links shown in blue and incomplete links in red. You can also check who started the workflow and when, and who's working on what.

Office.IQ works under Windows 3.*x* and Windows 95 on NetWare 3.11 or later. Program and data files reside on the server, and the client software is installed from the server. The simplest Office.IQ implementation, one database on one network, can be scaled up to work on multiple databases and networks linking several workgroups.

With its profusion of tools, Office.IQ may be intimidating. But it lets you create smart workflows without programming, and it can pay off substantially if you make the effort.

—Pete Loshin

Pete Loshin is a Boston-based consultant.

OFFICE.IQ 2.1

This entry-level workflow package speeds real-world procedures, but the user interface could be cleaner.

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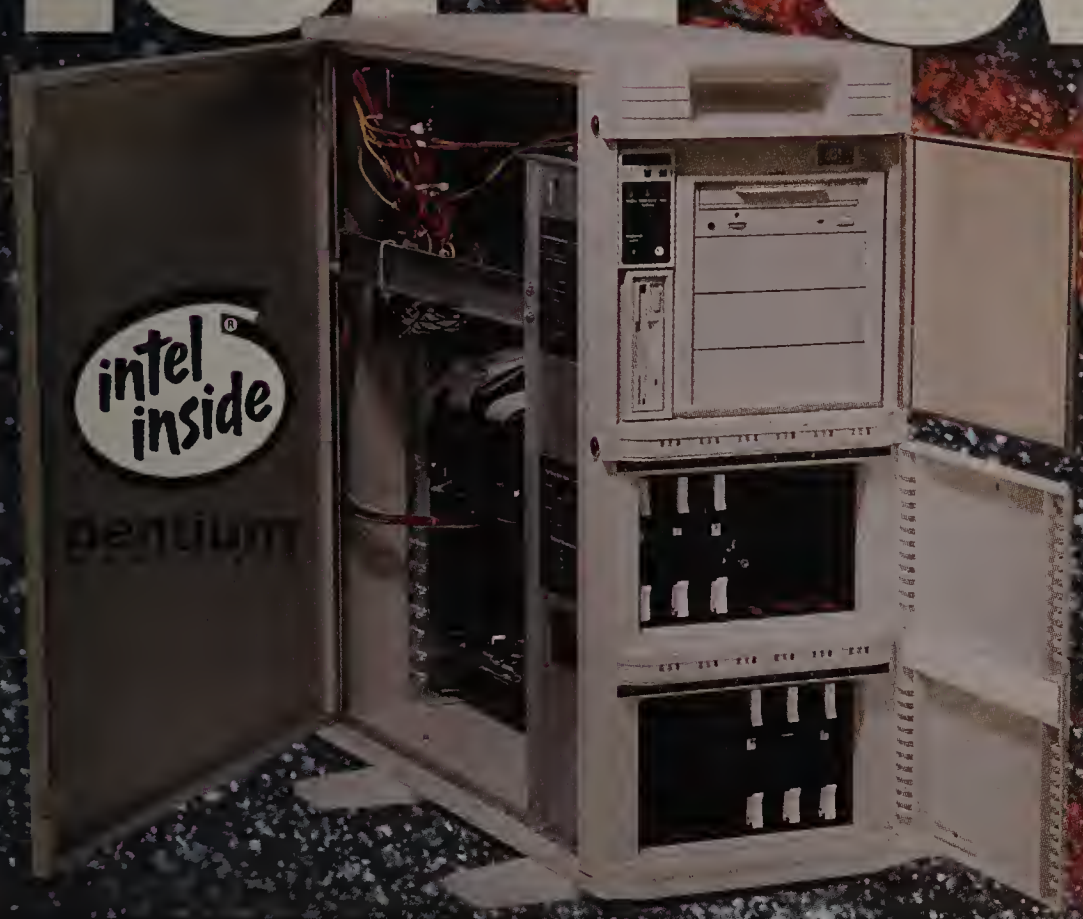

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• Adaptec 3940W Drive Controller	• Mylex PCI RAID Drive Controller	• Mylex PCI RAID Drive Controller
• 4X SCSI CD-ROM Drive	• 4X SCSI CD-ROM Drive	• 4X SCSI CD-ROM Drive
• 3.5" 1.44MB Diskette Drive	• 3.5" 1.44MB Diskette Drive	• 3.5" 1.44MB Diskette Drive
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• 3 ISA, 3 PCI Expansion Slots	• 6 EISA, 4 PCI Expansion Slots	• 6 EISA, 4 PCI Expansion Slots
• Tower Chassis (26"H x 10" W x 25.5"D)	• Tower Chassis (26"H x 10" W x 25.5"D)	• Tower Chassis (26"H x 10" W x 25.5"D)
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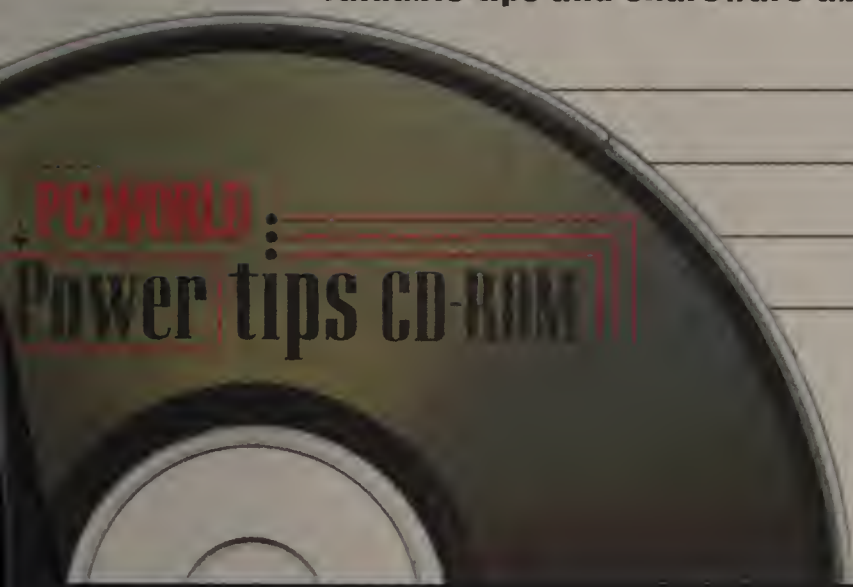

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FROM 586 TO PENTIUM PRO

Choosing Your Dream PC

First looks at the latest and greatest processors from Intel, Cyrix, NexGen, and AMD. Hands-on testing reveals the best bets for your next PC.

BY ERIC KNORR

The experts have been telling you what to buy for over a year: "Get a Pentium, what else?" But that helpful hint isn't much help anymore. Not only are there now eight Pentiums to choose from—ranging in speed from 75 MHz all the way to 180—but late last year Intel released the Pentium Pro, upstart Cyrix unveiled the Pentium-compatible 6x86, NexGen added faster chips to its Pentium-class Nx586 line, and AMD came out with its Am5x86 (see "Bargain-Basement PCs: Which CPUs Will They Use?"). And that isn't all: NexGen and its new corporate partner plan to release an Nx686 late in 1996, while AMD is cooking up its own Pentium competitor, code-named the K5.

Your current software will run on all these chips. So which should you select for your next PC? To give you an idea of what to expect from each chip, we created a new set of Windows 95 and NT tests. We ran them on some of the first systems to use the hot new CPUs, including five of the fastest Pentiums, three Pentium Pros, and two Cyrix 6x86s. We'd hoped to test a 120-MHz Nx586 PC, but none were available.

When we were done testing, one thing was clear: The 200-MHz Pentium Pro systems from Dell and Micron are the fastest boxes we've ever tested. And Dell's Pentium Pro-150 beat the average scores of our three 150-MHz Pentium sample systems by almost 30 percent. But there are two catches: Pentium Pro machines will likely cost $1000 or so more than comparably equipped Pentiums, and their performance advantage disappears when you measure stan-

dard 16-bit Windows applications (see December's *Top of the News*). By contrast, systems based on the Pentium or on Cyrix's 6x86 handle 16-bit applications well; the 100-MHz Cyrix 6x86 delivers performance similar to that of a 120-MHz Pentium. Our recommendations: Mainstream users who want top speed should go for a 166-MHz Pentium—which should start for about $2500, $4000 if you want it fully loaded—while budget-conscious buyers should strongly consider a 100-MHz Cyrix 6x86.

When it comes to PCs, processors are the last bastion of wide profit margins—there's plenty of room to cut prices. That means competition at the high end will result in the hottest PC values ever. Cyrix, NexGen, and AMD plan to compete with Intel by delivering comparable performance at lower prices, but they have one major disadvantage: Intel has by far the largest manufacturing capacity of any CPU producer, so it can drop its CPU prices almost at will. This month Intel is supposed to slash Pentium prices dramatically, and you can expect more cuts across the board later this year.

Of course, when you select a system, the price and performance of an individual PC is more important than the flavor of its CPU. Such factors as the speed of the motherboard also come into play—and if you're looking for a laptop, you're unlikely to find any of the chips we tested in mobile machines this year, with the possible exception of the Cyrix 6x86. Nonetheless, this guide should give you some idea which CPUs will be worthy of your PC dollar.

If you want pure speed, go for a 166-MHz Pentium. On a budget? Think about a 100-MHz Cyrix 6x86.

THE NEW CPUs AT A GLANCE

How fast they run, and how they compare to the Pentium

Vendor	Chip	Internal processing speed (MHz)	Comparable Pentium
AMD	SSA/5	75	Pentium-75
	K5	100	Pentium-133
		120	Pentium-150
Cyrix	6x86	100	Pentium-133
		120	Pentium-150
		133	Pentium-166
		150	Pentium-180
Intel	Pentium	150	Pentium-150
		166	Pentium-166
	P55C	150	n/a [1]
		166	n/a [1]
	Pentium Pro	150	none
		166	none
		180	none
		200	none
NexGen	Nx586	100 [2]	Pentium-100
		120	Pentium-120
		133	Pentium-133
	Nx686	180	n/a [1]

[1] Not available. [2] With FPU.

Software and a Shifting Landscape

For 99 percent of *PC World*'s readers, the first requirement for a CPU is that it run DOS, Windows 3.1, and Win 95 in native mode, without resorting to using sluggish emulation—as, for instance, a Macintosh PowerPC chip would have to do. If you've already invested in one of these operating systems and its applications, you should stick with an *x*86 CPU, such as the Intel, AMD, NexGen, or Cyrix processors that we looked at for this article.

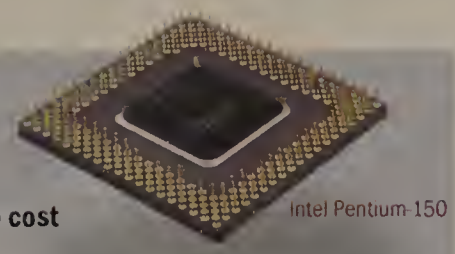
But there's more to CPUs than *x*86 compatibility, due to the gradual, ongoing shift from the 16-bit world of DOS and Windows 3.1 to the 32-bit world of Windows 95 and Windows NT. With the introduction of the Pentium Pro, we have a chip optimized for the latest 32-bit software—and one that actually runs 16-bit software slightly *slower* than its predecessor, the Pentium.

To help you choose a PC for the long haul, we ran 32-bit application-based benchmarks under Windows 95 and Windows NT (OS/2 users should pay attention to the latter). As we expected, the Pentium Pro ran Windows NT better than it did Win 95, which means that at least in the short term, the chip will be of interest primarily to the NT faithful—those who work with high-end graphics workstations or network servers, not with mainstream desktop PCs. The reason the Pentium Pro doesn't do as well with Windows 95: A small but significant amount of 16-bit code in the operating system chokes the chip. Run 16-bit applications under Windows 95 on a Pentium Pro, and the chip's performance advantage erodes dramatically.

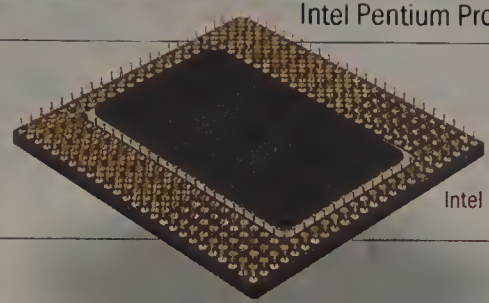
Our recommendation that mainstream users forgo the Pentium Pro and choose a Pentium or a Cyrix 6x86 is based primarily on the results of our Windows 95 tests and our recognition that very few mainstream users work in a pure 32-bit environment. But this year that may change: Microsoft has been repositioning NT as a desktop OS for power users—remember, developers have to make their applications NT compatible to earn Microsoft's coveted Windows 95 logo. In an NT environment, you might also wish to consider chips that can't run DOS, Windows 3.1, or Windows 95, such as the PowerPC, Digital's Alpha, and the SPARC family of processors. But for most desktop users, those aren't viable options.

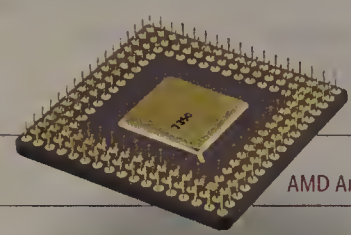
HERE THEY COME: Timetable for the New CPUs

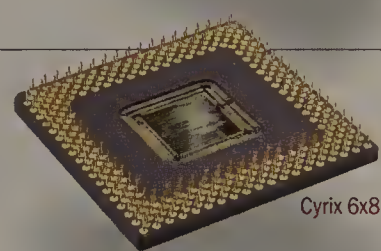
When you can expect to see systems using the new CPUs, and how much those first systems are likely to cost

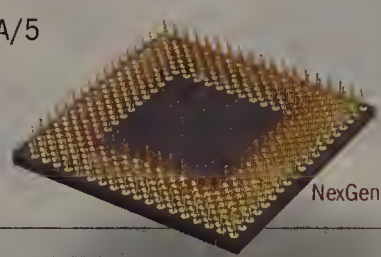

Intel Pentium-150

	Fourth quarter 1995	First quarter 1996	Second quarter 1996	Third quarter 1996	Fourth quarter 1996
$4000–$4500			Intel Pentium Pro-200[1]		
$3500–$4000	Intel Pentium Pro-150 Intel Pentium Pro-166 Intel Pentium Pro-180 Intel Pentium Pro-200[2]				AMD/NexGen Nx686
$3000–$3500				AMD K5	
$2500–$3000		Intel Pentium-150 Intel Pentium-166	Cyrix 6x86-133 Intel P55C-150 Intel P55C-166	Cyrix 6x86-150	
$2000–$2500	Cyrix 6x86-100 Cyrix 6x86-120 NexGen Nx586-PF100[3] NexGen Nx586-P120 NexGen Nx586-P133	AMD SSA/5			


Intel Pentium Pro-150


AMD Am5x86


Cyrix 6x86


NexGen Nx586

[1] 512K cache. [2] 256K cache. [3] Only Nx586 with FPU.

Speed Inside and Out

People often assume you can judge the performance of a chip by its *internal processing speed* (sometimes incorrectly called the clock speed). This has never been true, except when you're talking about chips of the same type: For example, a 33-MHz 486DX is roughly 32 percent faster than a 25-MHz 486DX. Think of the internal processing speed as a measurement akin to a car engine's rpm, while different chips are like different engines altogether. The Pentium Pro has the biggest, meanest engine, which enables it to deliver more power than the Pentium at the same rpm (as long as it's running 32-bit software).

While many users mistakenly assume that internal processing speed equals overall chip speed, they also often ignore a second crucial factor in CPU performance: *external bus speed*, also known as motherboard speed. For the chips we tested, the bus speed is either 60 or 66 (66⅔, to be exact) MHz, and that 6-MHz difference is significant. For example, it's one reason why the 150-MHz Pentiums we tested, which sit on a 60-MHz bus, perform on average about the same in our Windows 95 tests as our baseline 133-MHz Pentium, which uses a 66-MHz bus.

The Pentium Pro packs the biggest, meanest engine, so it delivers more power than a Pentium at the same RPM.

To compensate for this discrepancy between internal and external processing speeds, today's CPUs rely on internal (or primary) memory caches, small quantities of very fast RAM built into the chips themselves, where they can store data they'll most likely need. When a CPU can't find what it needs in this internal (or L1) cache, it generally turns to a secondary (or L2) cache. These new chips implement this secondary cache in subtly different ways: In Pentium and 6x86 systems, this secondary cache resides on the motherboard and runs at bus speed. NexGen's Nx586 also employs an external secondary cache but uses high-speed cache memory with which it communicates via a high-speed interface; this design requires specially configured motherboards. The Pentium Pro is the only CPU we looked at with a secondary cache that's built right into the CPU.

Pushing the Envelope

Memory caches aren't the only design tricks that vendors use to speed their chips. For example, how do Pentium competitors manage to deliver more power at the same internal processing speed? To extend the car analogy, they add cylinders: Whenever possible, the chips execute multiple instructions at the same time.

Take the Pentium Pro. When it receives *x*86 instructions—technically known as *complex* instructions—it translates them into *reduced* instructions that can be more easily executed in parallel. NexGen's Nx586 uses a similar strategy, as will AMD's eagerly awaited K5. Viewed from the outside, these are CISC (Complex Instruction Set Computer) chips, but on the inside they're basically RISC (Reduced Instruction Set Computer) processors (see "The Holy War: CISC Versus RISC"). By contrast, the Cyrix 6x86 claims to be a CISC chip to the core, executing multiple *x*86 instructions simultaneously without the translation.

Another trick manufacturers use to maximize performance: Make the chips smaller. The smaller the chip, the shorter the distance that instructions and data travel, and the faster it all runs. For example, Intel used .6- and .8-micron technology for all Pentiums through the 100-MHz model but moved to .35-micron technology for the 120-MHz and higher versions (1 micron is one millionth of a meter). Currently the Cyrix 6x86 uses a .6-micron process and tops out at 120 MHz; to achieve higher internal speeds, Cyrix plans to switch to a .5-micron process in the first half of this year.

The next Pentium will probably run at 180 MHz. Then look for the P55C, designed specifically for multimedia.

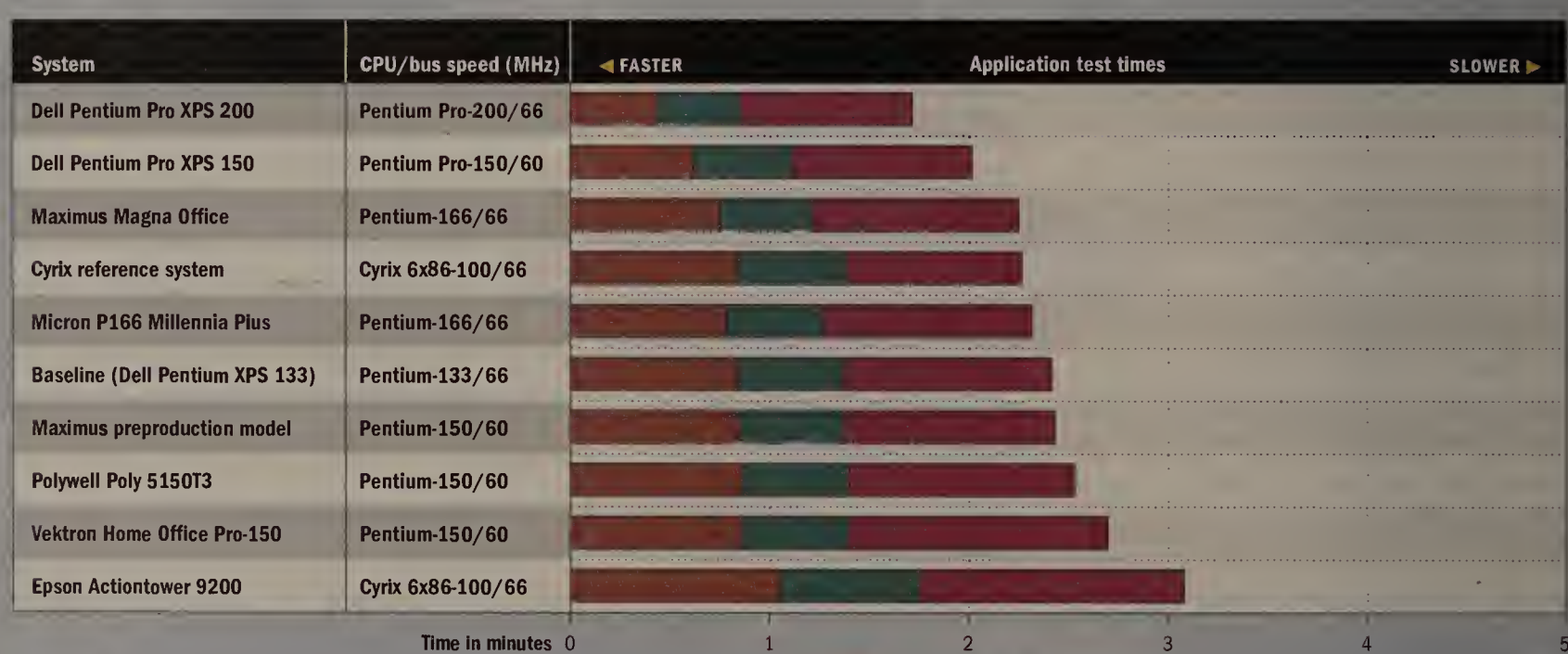
Vendors also tweak performance by optimizing the CPU's chip set, the group of satellite processors that enables the CPU to interact with memory and the expansion buses. One of the hottest chip set features is support for Extended Data Out RAM, which enables the CPU to retrieve hunks of data from main memory quickly when it can't find what it needs in the caches. The latest Pentium and NexGen chip sets support EDO RAM, while the only available Pentium Pro chip set does not. The Cyrix and AMD chips plug right into existing Pentium motherboards, letting them take advantage of any improvements in the Pentium chip set.

Finally, lest we forget, virtually all of these new chips are really two processors in one. Each has a built-in floating-point unit dedicated to intensive number crunching. In standard business applications, FPUs may help with some financial and statistical operations. Otherwise, CAD users reap the biggest benefits from FPUs—in fact, CAD and high-end graphics programs often require an FPU in order to run at all. The

TEST REPORT

WINDOWS 95: Pentium Pro Not Fast Enough

The Pentium Pro may be fast, but it isn't worth the money if you're running Windows 95: A Dell using the Pentium Pro-150 was only 7 percent faster at our Excel 95 benchmark than our baseline Dell Pentium-133 system.



Methodology Whenever possible, we tested using the vendor-configured versions of Windows 95 and Windows NT 3.51. When this was not possible, we used the operating system's default installation. Each test system was configured with 16MB of RAM for the Windows 95 tests and 32MB of RAM for the Windows NT tests. All test applications used the default installation. We were unable to test the Cyrix systems with Windows NT, and the Micron Pentium Pro with Windows 95.

Word 95 **Word 6.0 for NT**

The Word macro opens large and small files; combines files; inserts text; auto-formats; conducts a search and replace; imports graphics; imports a 500-name database; and prints and saves several times.

Pentium Pro is designed to compete with number-crunching workstation CPUs, so its souped-up FPU should beat all others in this group by a mile in math-intensive applications.

Remember, this is only a general overview of what's coming over the horizon in a rapidly changing CPU landscape. The recommendations in the capsules that follow are based on tests of the very earliest sample systems and analyses of chip specifications and release schedules. They're intended to give you a general idea of where these CPUs are likely to fall in the price/performance spectrum, which should help you plan your PC purchases for the next couple of months. As computers using these new chips hit the market in force, we'll test and compare them individually in our Top 20 system reviews. Will the Pentium alternatives climb our Top 20 charts? Watch this space.

AMD's K5 will provide competition for the Pentium, which augurs well for future Pentium-class system prices.

AMD K5

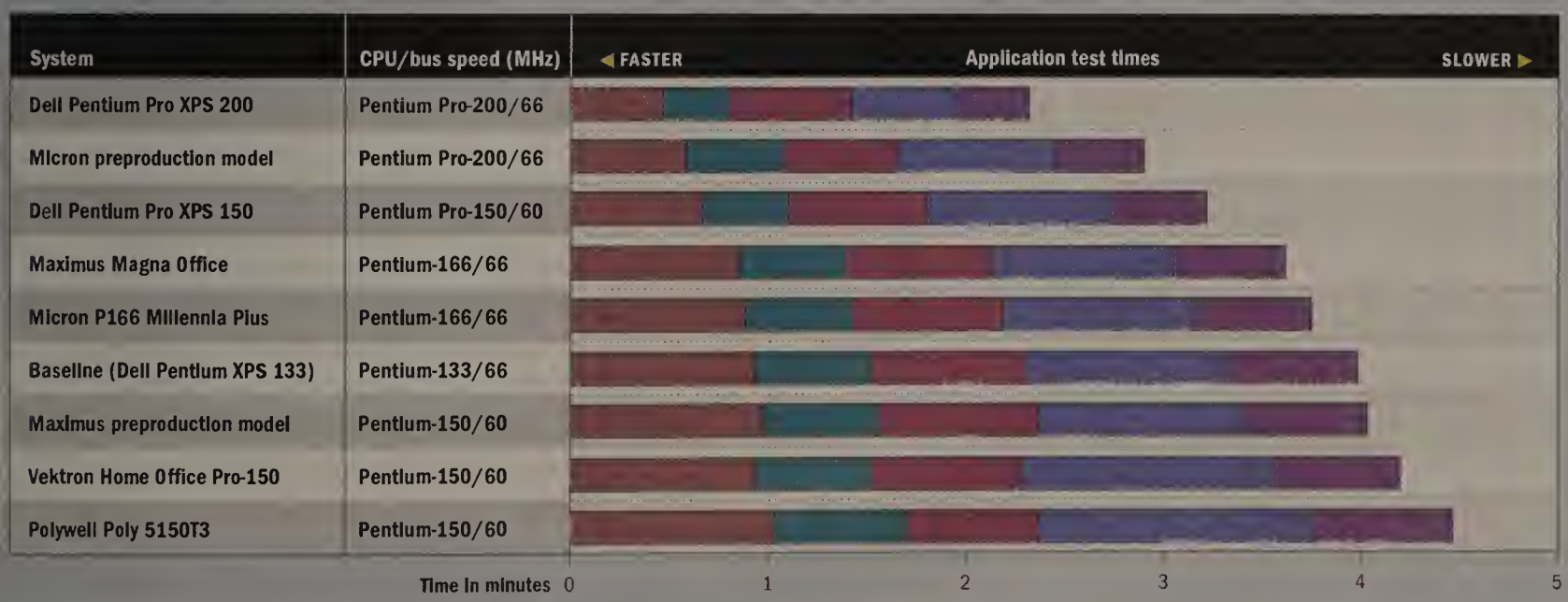
AMD's latest chip, the Am5x86, is really a glorified 486. Computer buyers waiting for a Pentium competitor from AMD will have to stand by until later this year for the chip code-named the K5. AMD claims that the K5, when it finally arrives, will deliver 30 percent better performance than Intel's Pentium at any given internal processing speed. Like the Cyrix 6x86, AMD's K5 will plug directly into existing Pentium sockets and will require only minor tweaks to the BIOS. In other words, when the K5 emerges, it will provide yet more direct competition for the Pentium processor, which augurs well for future Pentium-class chip and system prices.

When exactly will the K5 arrive? AMD says systems containing the first version of the chip, dubbed the SSA/5, will ship in the first quarter of this year. According to AMD, the 75-MHz SSA/5 will lack the full-fledged K5's optimization—so it will supposedly deliver the same performance as a Pentium-75 (on the same 50-MHz bus), the only advantage being a lower price. AMD will replace the SSA/5 with the fully optimized K5 in the third quarter, launching the latter as a 100/66-MHz chip, with a 120/60-MHz version planned for release by the end of the year.

AMD has been working on a K6 processor as well. But last fall, when AMD bought NexGen, AMD apparently scrapped its own

WINDOWS NT: Pentium Pro Leader by a Long Shot

While the Pentium Pro was relatively lackluster in our Windows 95 tests, it shone under Windows NT: The Dell Pentium Pro-200 was twice as fast as our baseline Dell Pentium-133 in our Word 95 test when running under NT instead of Win 95.



Excel 95 **Excel 5.0 for NT**
The Excel macro recalculates a large adjustable-rate loan amortization; sorts another database on multiple fields; creates auto-filters; creates charts; inserts and deletes rows; changes fields; imports a 500-name database; and prints and saves several times.

Picture Publisher 95
The Picture Publisher macro opens numerous pictures; manipulates them with special effects such as masks, inversion, tinting, cutting, and texture imposition; and adds large, scaled text with color and special effects.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

K6 design and announced that NexGen's forthcoming Nx686 and the K6 would be one and the same. Building on the same architecture as the Nx586, the Nx686 will supposedly run 16-bit code up to twice as fast as the Pentium Pro and 32-bit code up to 33 percent faster. In its initial 180-MHz version, the Nx686 will follow the NexGen strategy of using a full-speed secondary cache outside the chip, which means standard Pentium (or Pentium Pro) motherboards won't work with it. Expect the Nx686 in late 1996.

It's too early to tell which system manufacturers will gobble up K5 or Nx686 chips. But the full-fledged K5 should prove a worthy alternative to the Pentium, along the lines of the Cyrix 6x86, so it's a safe bet that a host of vendors will plug K5s into existing Pentium motherboards this year. The Nx686's performance projections, if accurate, would seem to make it a better buy than the Pentium Pro. But Pentium Pro performance will be a moving target, and the Nx686's proprietary motherboard requirement could make system prices too high to justify the extra kick in speed.

Cyrix 6x86 systems could even exceed the Pentiums for price/performance—good news, provided you can find one.

Cyrix 6x86

The most viable Pentium alternative yet, the Cyrix 6x86 plugs right into a Pentium socket and requires only minor modifications to the system BIOS. With better performance than the Pentium at the same internal processing speed, the ability to work with current Pentium chip sets, and a pledge from Cyrix to beat Intel prices, the 6x86 should find its way into a number of attractively priced systems this year, with AST and Epson among the first takers. Cyrix has also convinced several manufacturers to build chip sets that support the 6x86's linear-burst mode, a proprietary scheme for quickly refilling the chip's internal cache.

Currently Cyrix's 6x86 processor tops out at 120 MHz, but the company hopes that systems containing the 133-MHz version will go on sale by June. The only other announced version, the .5-micron 6x86-133, should find its way into PCs by fall. In the meantime, AST, which last year received an exclusive deal on an early batch of 80-MHz 6x86s, should be selling entry-level computers that contain these chips for rock-bottom prices. (For information on Cyrix's 5x86, see "Bargain-Basement PCs: Which CPUs Will They Use?")

No word on upgrades for 6x86 systems, but Cyrix built its business on upgrade

BARGAIN-BASEMENT PCs: Which CPUs Will They Use?

The best deals in desktop computing start with the 100-MHz Pentium and its competitors, but you may not feel flush enough to part with the $2000 or so that those systems currently cost. You could save several hundred dollars by buying a PC using a 75-MHz Pentium. Or you could save even more by purchasing a system that uses one of the new entry-level processors from AMD or Cyrix.

AMD's DX4-120 and Am5x86 are simply souped-up 486s. The DX4-120 has limited appeal; it works only in 40-MHz motherboards, tripling the bus speed to achieve Pentium-like performance. The Am5x86 also has a 486 core, but it quadruples 33-MHz motherboard speed for an internal processing speed of 133 MHz. To reduce cache misses, the chip has a 16K cache, twice the size of the AMD DX4's (but the same size as the Intel DX4's).

Like its 6x86 sibling, the Cyrix 5x86 processes more than one instruction at a time, enabling it to work faster than 486s with the same internal processing speed. The initial versions, which like the 486 have a 32-bit data bus, run at 100 MHz on either a 50-MHz or a 33-MHz bus or at 120 MHz on a 40-MHz bus. Cyrix plans to release a 100-MHz version with a 64-bit data bus by the time you read this, with a 133-MHz 64-bit version following closely on its heels.

Unfortunately, buying a desktop system containing one of these chips is probably penny-wise and pound-foolish. For one thing, you'd be ineligible for future Intel OverDrive upgrades for Pentium systems—upgrades that should deliver an especially big boost to Pentium-75s. Like the 486 OverDrives, these upgrade chips will probably increase system speed not by introducing a new chip architecture but by multiplying the clock more than the original chip did. Theoretically, you'll be able to upgrade a Pentium-90 to a Pentium-150, thereby multiplying the system clock by 2.5 times instead of the original chip's 1.5 times.

Upgrades may not matter that much because these three bargain chips are most likely to land in laptops, which are seldom upgradable. *PC World* will likely receive a number of laptops with these chips over the next few months, and we expect at least a few of them to score well in the budget category of our Top 20 notebook reviews.

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chips, so it's a fair bet the company will supply them someday. (If so, Cyrix might also offer them to Pentium users if the BIOS problem can be solved.) The more immediate question, however, is how many 6x86 CPUs will actually be delivered this year. IBM will do the manufacturing, cranking out one 6x86 under its own label for every chip it fabricates for Cyrix, but the capacity of IBM's chip facilities is dwarfed by Intel's massive foundries. If no compatibility problems surface, our best guess is that these 6x86 systems may match or even exceed the price/performance of Pentiums—good news, provided you can find one.

Intel Pentium

Though the Pentium has been around longest, it's still the chip of choice. The new 166-MHz model should outperform all competitors except the Pentium Pro, and if predictions hold that Intel will cut prices sharply this month, Pentium systems should become even more irresistible. With its mature technology, blazing internal processing speed, and fast 66-MHz external bus, the Pentium-166 will likely be the hottest value for many months to come. Unfortunately, the sample systems we tested don't reflect the chip's potential—they're only 10 to 15 percent faster than our baseline Pentium-133. But this is consistent with a general rule in the computer business: The first systems using a given chip are always slower than systems that are released later. The next generation of Pentium-166s should be winners.

The 133- and 100-MHz Pentiums are the next-best choices after the 166. Intel is phasing out the 120- and 90-MHz chips, and the 150-MHz chip, with its slower 60-MHz bus, makes it less attractive than the 133 (unless you can find it for the same price). The next step for the Pentium will be 180 MHz, with 200 MHz as the likely internal processing ceiling. In the second quarter of this year, the company also plans to release a version of the Pentium codenamed the P55C, designed to improve the performance of multimedia applications.

Intel has also announced plans to release processor upgrades for its entire Pentium line. While details are not yet available, the company avers that no current Pentium

THE HOLY WAR: CISC Versus RISC

All PC-compatible, *x*86 CPUs are Complex Instruction Set Computer processors. One is humming along on your desk right now, or you're probably reading the wrong magazine. But if you have a neighbor with a new Macintosh, or a friend who renders intricate engineering drawings for a living, there's probably a Reduced Instruction Set Computer CPU under the hood of their machine.

What's the difference between CISC and RISC? From the PC-centric standpoint, the practical difference is that *x*86 CISC processors run DOS, Windows 3.1, and Windows 95 in native mode—that is, without software translation to bog down performance. But CISC and RISC also reflect two rival philosophies of computing (put a CISC designer and a RISC designer in the same room, and watch the sparks fly).

RISC processing requires brief software instructions of equal length, which are easy for a CPU to process quickly and in tandem. By contrast, a CISC processor must crank through longer instructions of unequal length. More work gets done when a single CISC instruction is processed, but it's harder to process multiple CISC instructions at the same time.

RISC proponents contend their processing method is more efficient—and more scalable, so architects can more easily add execution units to an existing design and boost performance (*execution units* are the circuits inside a chip that do the most work). By the same token, RISC facilitates true multiprocessing, where several CPUs work symmetrically as they divide up, execute, and reassemble an instruction stream; CISC chips can do the same thing, but they're not as effective at it. The simplicity of RISC instructions also means they require less logic to execute, reducing the cost of the chip. Few in the CISC camp dispute any of this. They merely point out reality: The vast majority of PC software is written for CISC processors, and the advantages of RISC won't change that anytime soon.

Some RISC boosters point out that because you can run Windows NT on RISC processors, you can run Windows applications (under NT) without emulation on a RISC computer. They're right about that, but you would probably be disappointed with the performance: The vast majority of today's PC applications were written and compiled specifically for Intel-compatible CISC systems. To take full advantage of the RISC architecture, current PC apps would need to be recompiled and in some cases rewritten.

The whole CISC/RISC debate may soon be irrelevant because the two technologies are converging. The Pentium Pro, the Nx586, and the K5 are all basically RISC processors at their core. They take CISC instructions and break them down into RISC-like instructions that can be executed several at a time. For the generation following the Pentium Pro, Intel and Hewlett-Packard are collaborating on a true hybrid CPU that can accept both RISC and CISC instructions. If that chip sets a standard, it could accelerate the slow but inevitable shift toward RISC-optimized software. A RISC world would mean less expensive, more powerful CPUs. And when you wanted to upgrade, you could just add another CPU instead of getting rid of your old one.

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sockets will accept upgrade chips incorporating Pentium Pro technology. That leaves two ways for upgrade chips to boost Pentium system performance: Multiplying the bus speed by a larger factor, or offering a larger internal cache. Intel's OverDrive processors for 486s use the former method (the DX4 uses both), multiplying the bus speed by no more than a factor of 3. That suggests future Pentium upgrades will max out at 150, 180, or 200 MHz, depending on the original motherboard speed. Intel has not said it has plans for a Pentium Pro OverDrive upgrade for current Pentium systems. But in any case, instead of banking on theoretical upgrades, you should always buy the fastest system you can afford. For many of us, that will be a Pentium-166 computer.

Intel Pentium Pro

According to Intel, when the Pentium Pro was first on the drawing board, the chip's architects had a choice of optimizing the chip for 32-bit software or 16-bit software. With its built-in secondary cache, the chip was already huge, so there wasn't enough physical room for logic to optimize for both. They chose to bet on 32-bit. As a result, with the mix of 32-bit and 16-bit software that most people run today, the Pentium Pro represents a much smaller jump in performance over the Pentium than, say, the Pentium over the 486.

Rumor has it that the 150-MHz version of the Pentium Pro, with its 60-MHz bus speed, will probably be short-lived. If you need maximum Windows NT speed, you should probably go for the Pentium Pro-200 or the 166-MHz version (unavailable for testing at press time), both of which plug into 66-MHz buses and should be shipping by the time you read this. Because of its larger internal cache, the Pentium Pro can handle faster internal processing speeds than the plain Pentium; versions with internal processing speeds of up to 266 MHz (four times 66 MHz) are theoretically possible with current motherboards.

Top performance may send some mainstream power-hungry users, checkbook in hand, in pursuit of the Pentium Pro—our tests show that if you run only 32-bit applications under Windows 95, you'll enjoy unbeatable speed. But for most of us, systems containing Intel's fastest processor will simply be too expensive. The bulk of this year's Pentium Pro buyers will likely be workstation users lured by the hot FPU and stunning 32-bit performance.

NexGen Nx586

Give credit where credit is due: When NexGen's Nx586 was introduced in the fall of 1994, it was the first processor to employ internal, RISC-like instructions for fast parallel execution—and the first to support a secondary cache that ran at the same speed as the CPU core. The resulting chip ran about 10 percent faster than the Pentium at the same internal processing speed. But several problems prevented the Nx586 from taking off.

First and foremost, the Nx586 needs its own motherboard and chip set. For some time, a small company called Alaris was the only motherboard manufacturer, and NexGen was (and remains) the sole company to make the Nx586 chip set. This—along with the expensive superfast external secondary cache—added significantly to the system cost. Moreover, until last fall the NexGen chip set supported only the VESA local bus, not the more popular PCI bus. And the Nx586 didn't have an FPU. Then there was the marketing problem: NexGen named its chips after the closest comparable Pentium, not after the internal processing speed; the Nx586-P90 actually had an internal processing speed of 84 MHz, while the Nx586-P100 ran at 93 MHz. Problem is, the Pentiums to which they were comparing themselves kept getting faster. For example, while Pentium-90 systems kept getting faster, NexGen Nx586-P90s didn't.

It's tough to see how NexGen Nx586 PCs can match the price/performance of either Pentium or Cyrix 6x86 systems.

Much has changed. Last fall NexGen introduced a new PCI chip set incorporating the latest features of Intel's Triton chip set. The company also introduced an FPU version of the chip. Better, the Nx586 is now available in P120 and P133 versions—and those are the true internal processing speeds, folks, with 60- and 66-MHz bus speeds, respectively. Only actual systems will tell us whether these boxes will really perform better than their Pentium equivalents. Perhaps most promising is NexGen's recent purchase by AMD, whose large-scale manufacturing facilities may help reduce the cost of NexGen parts while ramping up the volume. With so much proprietary technology, though, it's tough to see how Nx586 systems can match the price/performance of either Pentium or Cyrix 6x86 systems.

For most of us, systems containing Intel's fastest chip—the Pentium Pro—will simply be too expensive.

Eric Knorr is a contributing editor for PC World *and editor and principal author of* The PC Bible *(Peachpit Press, 1995, 800/283-9444).*

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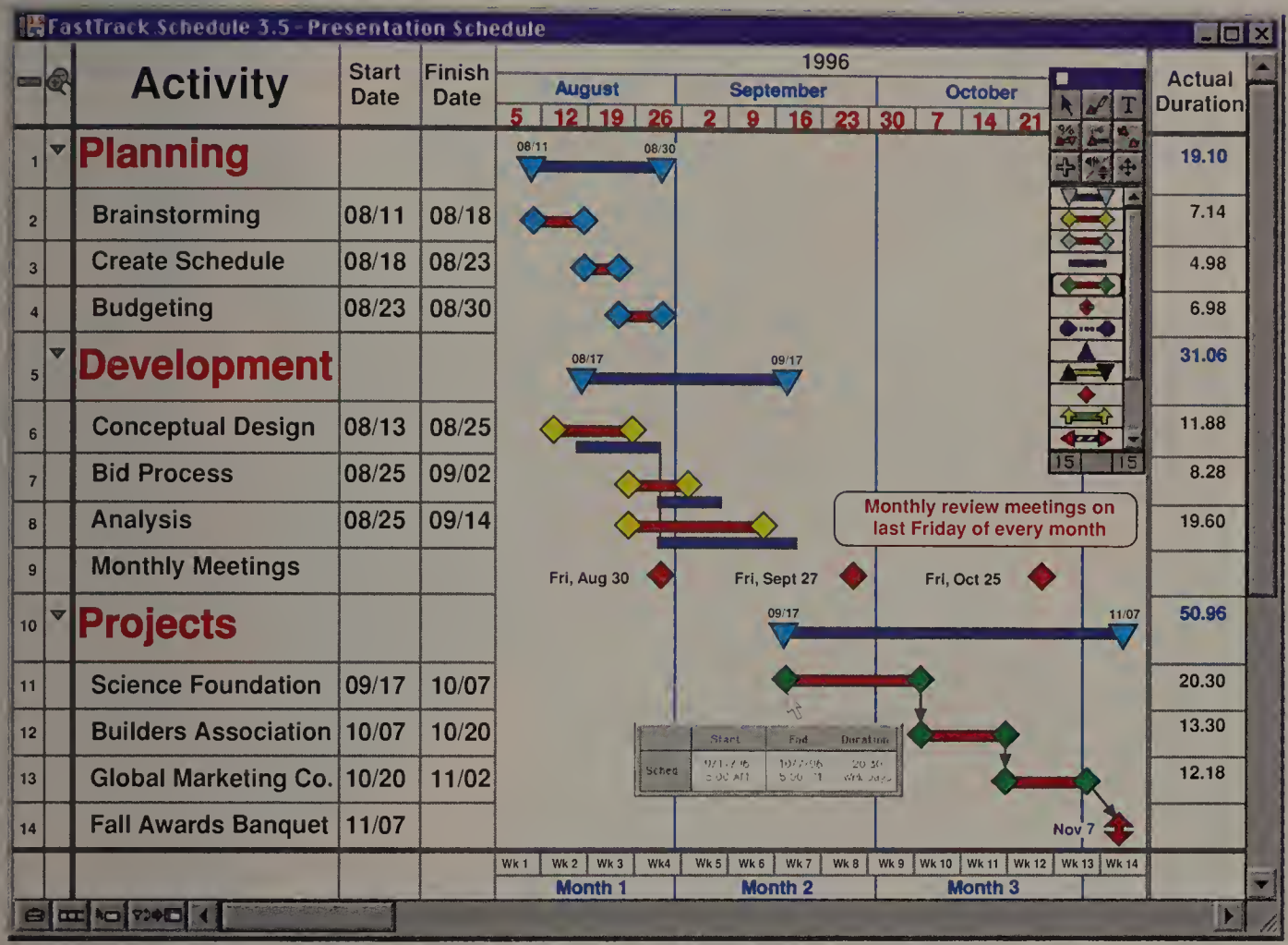

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versus

Now that the dust has settled, which 32-bit operating system is right for you? We weigh the pros and cons of the four major contenders.

DOWS 95 WINDOWS NT WARP versus MAC

By now, you probably know quite a bit about Windows 95's pleasures and perils—if not from first-hand experience, then from war stories told by friends and colleagues who've taken the plunge. You've likely found, as we have at *PC World*, that Microsoft's newest operating system is more powerful, reliable, and user-friendly than Windows 3.*x*—as long as your PC is potent enough to handle it.

If these two versions of Windows were the only operating systems around, there wouldn't be much of a contest. But Windows 95 is hardly the first 32-bit operating system to arrive on the scene claiming advantages over Windows 3*x*. For years IBM has trumpeted OS/2 as a superior environment to Windows; and Microsoft itself has been shipping Windows NT, its first 32-bit version of Windows, since 1993 (albeit to relatively little fanfare). And then there's Apple's Mac OS, the operating system used by Macintosh computers—and the mother of all graphical interfaces for personal computers.

Now that Windows 95 is a reality—it's available, in wide use, and supported by an initial wave of software—we thought the time was right to compare it closely with OS/2 Warp 3.0 and Windows NT Workstation 3.51. We also put the Mac OS 7.5.2 through its paces, just to see if the perennial rivalry between Intel-com-

BY HARRY MCCRACKEN AND TINOO SINGH

patible PCs and Macs has evolved with the introduction of Windows 95.

So how did Windows 95 fare against its more mature 32-bit competitors? For typical users stepping up from Windows 3.*x* it does rather well, thanks to a blend of usability, speed, and compatibility with existing software and hardware. But of course not everybody is a typical Windows 3.*x* user. Each of the other products here is a better fit for some computing needs than Windows 95.

The Joys of 32-bit Computing

Intel-based PC hardware has been capable of 32-bit processing power since 1986, when systems based on the 386 processor hit the scene. But it took a long time for operating systems to catch up. The first mainstream 32-bit OS for PC compatibles, OS/2 version 2.0, debuted in 1992; the second, Windows NT 3.1, was released in the fall of 1993.

Remarkably, the standard version of Windows (as opposed to Windows NT) remained a 16-bit operating environment until the release of Windows 95 last August. Windows 3.*x* needs to run on top of MS-DOS, a 16-bit operating system left over from the early 1980s, a simpler age when 640K seemed like plenty of RAM and graphical user interfaces hadn't yet emerged from the R&D lab. The DOS underpinnings are responsible for most of Windows 3.*x*'s weaknesses, from its memory problems to its infamously cryptic file names.

You can gain immediate productivity benefits by moving to any OS covered here, assuming that your computer is powerful enough to rise to the occasion. For starters, unlike Windows 3.*x*, these OSes can take full advantage of the processing power of 32-bit processors, leading to faster speed (when used with 32-bit applications) and the ability to multitask more programs at one time without encountering out-of-memory messages. All of them let you use long file names, and the Mac OS and Warp feature interfaces that let you manage both programs and files using one set of tools—leaving behind the perplexing boundaries of Windows 3.*x*'s (and Windows NT's) Program Manager and File Manager.

Windows 95, Windows NT, and OS/2 Warp also provide preemptive multitasking, a big improvement over Windows 3.*x*'s cooperative multitasking—so called because the applications you run, rather than the OS itself, decide when to pass control to another program. If a program won't relinquish control, you can't use another app at the same time. With preemptive multitasking, the OS divides up processing power, so that no one program hogs the PC's resources.

Know Your OS's Limits

Keep in mind that you can't expect to avoid every limitation imposed by Windows 3.*x* by stepping up to a 32-bit OS. For instance, Windows NT currently sports an aging interface similar to that of Windows 3.*x*, and the Mac OS lacks preemptive multitasking, so jobs such as copying files still take over the computer. Both operating systems have upgrades in the pipeline that will address these current limitations.

Also, you won't realize the full benefits of any 32-bit OS unless the applications you run are designed with that specific environment in mind. Older 16-bit programs designed for Windows 3.*x* can't take full advantage of a 32-bit OS's processing speed or use multithreading (multitasking of processes within a single program).

You also need to be sure that your computer has the hardware muscle to handle the upgrade. With at least 8MB of RAM and a fast 486 CPU, you can comfortably run OS/2 and Windows 95. Windows NT's extra layers of safety exact their price: to even consider running it, you really need at least 16MB and a DX4 processor. And if you find the Mac OS's siren song alluring, you'll need to buy a whole new computer.

Putting OSes to the Test

An operating system's interface and overall ease-of-use probably have more effect on your productivity than its raw speed, so we performed extensive usability testing in the PC World Test Center. Our guinea pigs included eight users with anywhere from a couple of years to more than a decade of computer experience, ranging from a col-

OUR RECOMMENDATIONS

No single operating system here is a definitive Best Buy that will make every computer user happy and productive. But if you want a PC-compatible OS that combines excellent usability with respectable performance and good compatibility with Windows 3.x, Windows 95 is your best bet. It's also relatively easy to learn when moving from other platforms, since it borrows good ideas from Windows 3.x, the Mac, and OS/2 Warp.

Even with the long strides Windows 95 has made in usability, our testers gave the Mac OS 7.5.2 a slight edge in overall usability. The Mac also aced our graphics speed tests, one of many strengths prized by artistic users. These virtues aren't so compelling that you should scrap your PC, but they're reason enough to consider a Mac (or Mac clone) when you shop for a computer.

Our testers ranked OS/2 Warp 3.0 and Windows NT Workstation 3.51 poorly in overall usability. If you can survive the unpleasant sense of déjà vu associated with Windows NT's aging interface, you'll find an OS that lets you multitask a variety of 16-bit and 32-bit applications in a secure, heavily crash-proof environment. OS/2 Warp 3.0 also multitasks 16-bit applications well, and comes with an excellent assortment of applications. But OS/2 has failed to garner much support from major software developers, and its prospects are worrisome considering that most major new programs are 32-bit Windows applications, which it can't run.

lege student and a theater director to a Windows 3.*x* trainer and a programmer.

Each tester had experience with one 32-bit operating system. While we invited their opinions on their OS of choice, they only tested the ones they *hadn't* already used. We also avoided a PC–centric orientation by conducting these tests in collaboration with *Macworld*, a sibling IDG publication.

We asked the testers to complete a variety of common tasks in each operating system they used. However, we provided no instructions or guidance on how to perform these tasks in each OS. Overall, the users concluded that the Mac OS still has a slim lead in ease-of-use (see "The Mac Is the Overall Usability Champ" for details).

We also tested each operating system's speed with typical business programs—using applications that are popular on each platform. No operating system emerged as the definitive speed champ; indeed, each of them was fastest at *something*. See the Test Report for a complete rundown, and read our evaluations of each system for details on their performance and multitasking abilities.

Seeking Perfection

Is any single operating system the best option for everybody? No, and none ever will be. As with any purchase you spend vast amounts of time with, there are simply too many factors for a one-size-fits-all solution to work. How you rank the relative importance of features like usability, stability, security, and ready availability of software will determine which OS is right for you.

Intangible factors also play a large role in determining which OS suits you best. What is intuitive to one user may seem entirely counterintuitive to another, as shown by the occasionally wildly varying opinions of our usability testers. Loyalty is a factor, too: No matter how much enthusiasm our testers expressed for one of these operating systems, few expressed any interest in abandoning their current operating system.

Opinions about Windows 95, both positive and negative, aren't hard to come by. In sidebars to our main article, we complement the findings of our usability testers with the opinions of three unabashed fans of operating systems other than Windows 95. Take a look at what these users have to say—along with what we discovered in the PC World Test Center—and you'll be well equipped to choose an operating system that matches both your business's needs and your personal work style.

Harry McCracken is a senior associate editor for PC World. *Tinoo Singh is test manager for* clnet, *a television series and online service. Peter D. Varhol is chair of the graduate computer science department at Rivier College in New Hampshire. Usability tests were designed by Susan Silvius and Lauren Black and performed by Susan Silvius and Lisa Rein; performance tests were designed by Susan Silvius and Jeff Kuta and performed by Jeff Kuta.*

THE MAC EDGES OUT WIN 95 IN USABILITY

1=Worst 5=Best

Task	Windows 95	Windows NT Workstation 3.51	OS/2 Warp 3.0	Mac OS 7.5.2	Comments
File and disk management	3.5	2.9	2.8	4	The Mac's consistent Finder remains the easiest interface, though Windows 95 was also well received.
Desktop customization	3.1	3.3	3.4	3.3	OS/2 Warp wins by a nose; Windows 95 suffers because setting programs to launch on start-up is tough.
Hardware and driver installation and use	3.8	3.1	2.8	3.4	Windows 95 wizards make working with hardware and drivers relatively painless.
On-screen help	3.4	2	2.7	4.6	Macintosh Guide shows exactly how to accomplish tasks; OS/2 Warp and Windows NT are often cryptic.
Overall usability	3.4	2.9	2.8	3.6	The Mac's only real ease-of-use competition comes from Windows 95.

BOB HOLMGREN

Methodology: We asked eight typical users to perform a variety of common tasks and then rate how easy each task was to perform on a scale of 1 to 5. All testers were users of one operating system, and tested only operating systems they weren't familiar with. Testers performed the tasks listed below.

File and disk management: Tasks included finding a file on the hard disk, determining a file's size and last modification date, determining the amount of free disk space, deleting and restoring a file, and formatting a floppy disk.

Desktop customization: Tasks included changing the display's wallpaper, resolution, and font, and setting a program to launch automatically on start-up.

Hardware and driver installation and use: Testers installed an external fax-modem and sent a fax, installed a laser printer and printed a letter, and installed QuickTime and played a video clip.

On-screen help: Testers judged each operating system's tutorials, context-sensitive help, and other features.

Overall usability: Scores include ratings of individual tasks plus ratings of overall impressions of the operating system's interface and usability.

Data based on tests designed and conducted by the PC World Test Center in collaboration with the Macworld Lab. All rights reserved.

The PC World Test Center's usability lab (shown at left) served as a proving ground in which eight users explored and rated each operating system.

WINDOWS 95

How It Really Stacks Up

PROS: Generally usable interface, solid on-screen help, strong compatibility with Windows 3.x

CONS: Some interface quirks, can't protect multitasked 16-bit programs from each other, retains some 16-bit code

THE BOTTOM LINE: Microsoft's hypermarketed operating system is a little bit Mac, a little bit Warp—and the most well-rounded choice for most PC users. *Microsoft, 800/426-9400*

Whether or not you've actually installed Win 95 on your computer, you've undoubtedly heard plenty about it. As Cliff Perona, one of our usability testers, put it, "Nobody's been impervious to the media and advertising—my *grandmother* was talking about Windows 95."

It's an easy call that Windows 95 is a big improvement over Windows 3.*x*, but rating it against its 32-bit competitors is a more complex matter. Each of the other systems is Windows 95's superior in some respects: The Mac remains a bit more usable; Warp is more customizable; and Windows NT provides a more secure environment. What makes Windows 95 stand out is its excellent overall balance of usability, compatibility, features, and performance.

Child of Mac and OS/2

Of all Windows 95's improvements, its spruced-up interface may have the greatest effect on your productivity. The changes from Windows 3.*x* are indeed striking, but what's equally noticeable is how much Windows' new look owes to the Mac and OS/2.

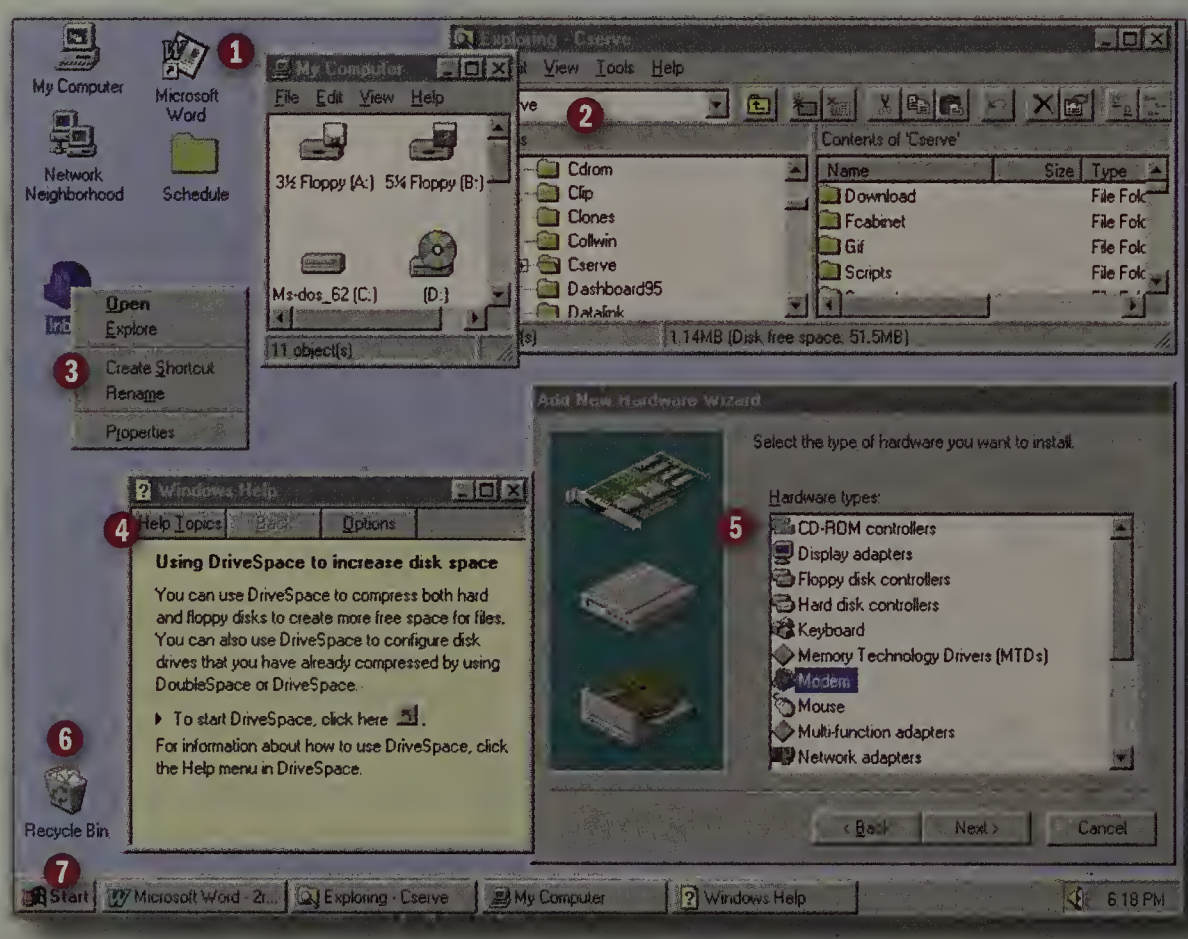
For instance, by dropping Windows 3.*x*'s File Manager and Program Manager in favor of folders that you manage using My Computer, Network Neighborhood, and the Explorer, Windows 95 is largely playing catch-up with the Mac's integrated approach to working with files. Other new features that ape essential parts of the Mac OS include the ability to drag icons onto the desktop and create Shortcuts, pointers to files that are really stored in another folder.

In other ways, Windows 95 behaves suspiciously like Warp. For instance, OS/2 pioneered the idea that pressing the right mouse button should bring up a menu of options relating to whatever you're then doing—as it does in Windows 95. And the way Win 95 organizes dialog boxes into tabbed subsections is nearly identical to the way OS/2's Notebooks work.

Most of our usability testers found Windows 95 easy to understand and use—significantly more so than Windows NT and OS/2 Warp, and just behind the Mac OS. In general, they applauded Win 95's on-screen help, particularly the hot links that let you jump directly to the tool you need. And although installing hardware was a trial-and-error process with every OS—none of them prevents mishaps like plugging a phone cord into the wrong jack—testers liked the way Win 95 uses wizards to steer you through problems.

Ultimately, the way Windows 95 combines concepts from Windows 3.*x*, the Mac, and Warp helped all our testers to feel fairly comfortable with it. Tester Elliott Kirschling, an OS/2 user, said that in general,

How You Work With Windows 95



1 Programs, documents, and Shortcuts (pointers to other files) can sit on the desktop.

2 The Explorer replaces the File Manager and Program Manager; testers criticized it as being unwieldy.

3 Clicking the right mouse button displays OS/2–like context-sensitive menus.

4 Many help screens include hot links that take you directly to the area you've asked about.

5 Hardware wizards don't remove all the pain from hardware installation, but do make it easier to diagnose and fix problems.

6 The Recycle Bin: a clone of the Mac OS's Trash.

7 The taskbar shows minimized running applications; the somewhat cumbersome Start button lets you launch apps.

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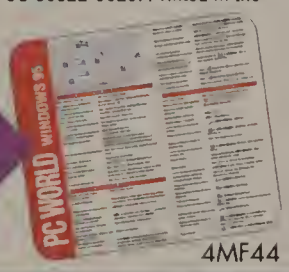

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Windows 95 "is more OS/2–like: Things are treated more like objects, so they're easier to manipulate." Even the Mac users conceded that Windows 95 has taken several giant steps toward equaling the Mac's friendliness. "I'd still buy a Mac," said tester Rick Aguirre, "but [Windows 95] is a much more formidable competitor to Apple now."

The Bad With the Good

As much as our testers found to like about Windows 95, this OS didn't come through unscathed. For instance, they universally condemned the convoluted six-step process Windows 95's on-screen help instructs you to go through in order to set up an application to launch automatically each time the operating system starts up.

The highly-touted Start button also wasn't well received: Users found it tough to wade through multiple layers of programs. And several Windows 3.*x* veterans said they preferred its dowdy old File Manager to Win 95's Explorer. One tester said the Explorer's single-window, dual-pane interface made copying files *harder*; another noted that the Explorer lacks a way to filter folder views by file extension—so only .exe files are shown, for instance.

Windows 95's Shortcuts aren't nearly as elegant as Shadows and Aliases, their counterparts in Warp and the Mac OS, respectively. Shadows and Aliases both automatically monitor the whereabouts of files they point to. But with Shortcuts, if you move a file, Windows 95 loses track of it. It can search your hard disk for the file, but it's a slow, imperfect process.

Rebuilding Windows 3.x's Engine

Under the hood, Windows 95 is as much a souped-up version of Windows 3.*x* as a brand new platform. Although it's primarily a 32-bit operating system, it retains some 16-bit code from Windows 3.*x*. (Early tests indicate that this design choice may limit Windows 95's speed on PCs built around Intel's Pentium Pro CPU, which was built with fully 32-bit operating systems in mind.)

Windows 95's spruced-up interface bears a striking resemblance to both the Mac OS and OS/2 Warp.

Besides running the great majority of existing 16-bit Windows and DOS applications, the new OS is compatible with real-mode Windows 3.*x* and DOS drivers. While these drivers can undercut the improved stability of Windows 95's 32-bit architecture, they ensure that you won't be hobbled by a lack of available drivers for your peripherals—a problem that continues to haunt both Windows NT and OS/2 Warp.

Unlike Windows 3.*x*, Win 95 can run 32-bit applications in protected memory spaces, with preemptive multitasking and multithreading, all of which leads to quicker, smoother, more reliable computing. The new operating system can also multitask far more applications at a time than Windows 3.*x* can, because it uses 32-bit (rather than 16-bit) chunks of memory to manage resources.

However, unlike OS/2 and Windows NT, Windows 95 puts all running 16-bit applications into a single portion of RAM, where one faulty app can bring down others in a domino-effect procession. Warp and Windows NT both let you run multiple 16-bit programs in isolated *Virtual DOS Machines*, a capability that limits the damage a faulty program can do. Another potential source of instability is that unlike Warp and Windows NT, which protect the operating system by shielding it off from running applications, Windows 95 permits applications to access the OS's system space.

TEST REPORT

32-Bit Applications: Each OS Has Its Strengths

Word Processing
Windows 95 and NT: Word 95
OS/2: Ami Pro 3.0b
Mac OS: Word 7.0 for Power Mac

Spreadsheets
Windows 95 and NT: Excel 95
OS/2: 1-2-3 2.1
Mac OS: Excel 5.0 for Power Mac

Graphics
Windows 95 and NT: Corel Photo-Paint 6.0
OS/2: Colorworks 1.0
Mac OS: Adobe Photoshop 3.0 for PowerPC

16-Bit Applications: Windows NT Lags Behind

WordPerfect 6.1 **Excel 5.0** **Picture Publisher 5.0**

Methodology
Testing of Windows 95, Windows NT Workstation 3.51, and OS/2 Warp 3.0 was performed on Hewlett-Packard 90-MHz Pentium PCs with 16MB of RAM, 256K of secondary cache, a 950MB hard drive, and an integrated video adapter. Mac OS 7.5.2 testing was performed on a Power Macintosh 7500 with a 100-MHz PowerPC 601 CPU, 24MB of RAM, a 96K disk cache, a 700MB hard drive, and an integrated video adapter. We used default disk cache and virtual memory settings for all operating systems. We tested each operating system's 32-bit performance by performing identical common business tasks in a word processor, a spreadsheet, and an image editing program native to each platform. Since the specific programs used varied by operating system, our test results reflect the speed of the programs as well the operating systems. We also tested the 16-bit performance of Windows 95, Windows NT, and OS/2 Warp by performing typical tasks using three Windows 3.x applications: WordPerfect 6.1, Excel 5.0, and Picture Publisher 5.0.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Going 95

Windows 95's speed varied among software categories in our performance benchmarks, but it always managed to stay competitive—it was the only OS that didn't finish last in any of the tests. When we ran it with 16-bit Windows 3.*x* versions of WordPerfect, Excel, and Picture Publisher, its results were almost identical to those of OS/2 Warp. Running the same 16-bit applications, Windows NT lagged far behind both Windows 95 and Warp.

In our tests of 32-bit applications, we partnered each OS with native word processing, spreadsheet, and graphics applications. Using Excel 95, Windows 95 finished the spreadsheet tests first; with Word 95, its word processing results were second to those of an OS/2 native version of Ami Pro running under OS/2 Warp. Using Corel Photo-Paint 6.0, however, it fell considerably short of the image-processing performance turned in by the Mac (using Photoshop) and NT (with the same version of Photo-Paint).

32-Bit Apps for the Masses

Anyone who presently runs Windows 95 probably uses a hodgepodge of 16-bit Windows 3.*x* and DOS applications, along with a few early Windows 95 products. Windows 95–compatible 32-bit software (most of which will also work with Windows NT) will not become widely available overnight; still, the applications are coming out with remarkable swiftness. By early October 1995, over 130 software packages had qualified for Microsoft's Designed for Windows 95 logo, ranging from business and home productivity programs to games and educational products. With more than 7 million copies of Windows 95 in circulation a few months after its launch, there's no doubt that software vendors will eagerly cater to the needs of Windows 95 users.

Combine Windows 95's bright software future with its mostly sound usability, much-improved (though not outstanding) multitasking, and strong compatibility, and you have an operating system with broad appeal. True, it's not the transcendent experience some of the early hype seemed to promise—but it's clearly the OS best equipped to take most Windows 3.*x* users into the world of 32-bit computing.

WINDOWS NT

Win 95's Buttoned-Down Sibling

PROS: Top-notch security and crash protection, fast graphics performance

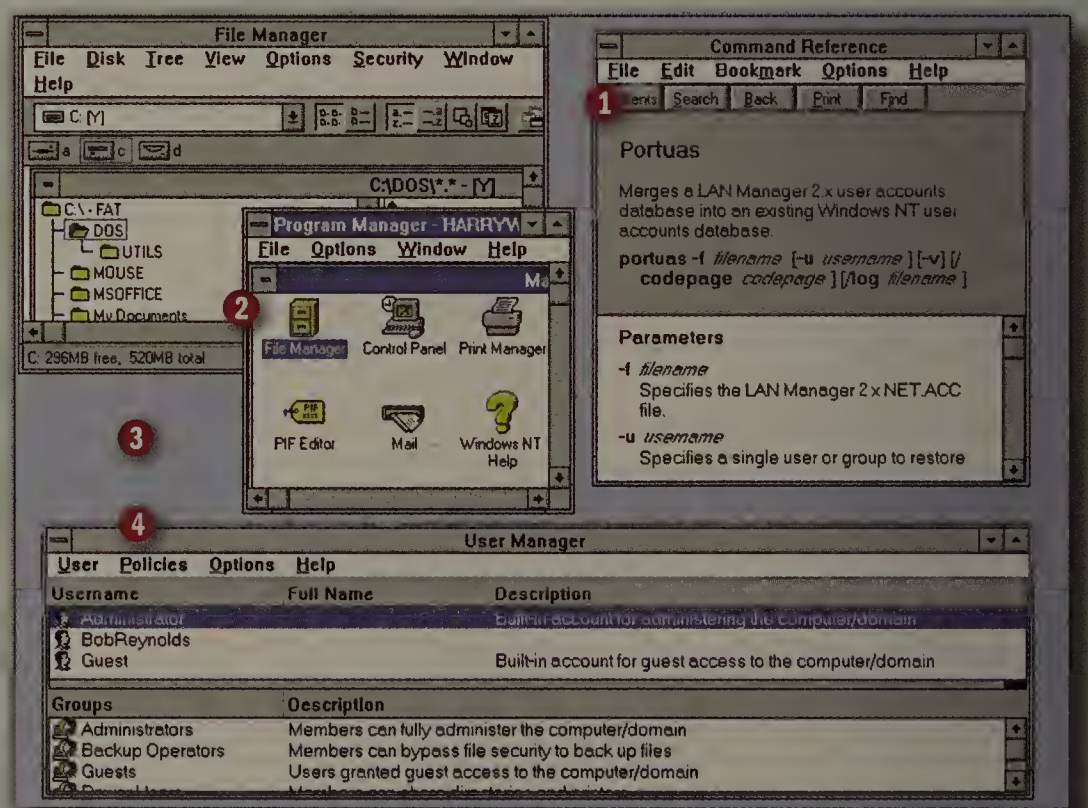
CONS: Aging, Windows 3.x–style user interface, heavy-duty hardware requirements, doesn't run all 16-bit applications, slow performance with Windows 3.x apps, no support for Plug and Play

THE BOTTOM LINE: Microsoft's industrial-strength version of Windows currently stresses safety and reliability above all else—including usability. *Microsoft, 800/426-9400*

Once you've made the move from Windows 3.*x* to Windows 95, encountering Windows NT Workstation 3.51 is somewhat like entering a time warp back to, say, the middle of last year. Its user interface looks almost the same as Windows 3.*x;* calling its on-screen assistance system *help* is being charitable; and it lacks support for Plug and Play and other essential Windows 95 goodies. So this is progress?

But as it turns out, there are good reasons why Windows NT is the right OS for some users. If you work in a business in which any data loss can be a costly disaster—like telemarketing—NT's emphasis on stability and security could be a lifesaver. (It was the only OS that never crashed in our tests.) At an imposing $319, it's for corporate types rather than home users; there's also no cut-rate upgrade price for Windows 3.*x* users or free phone support beyond your first call.

How You Work With Windows NT



1 One user likened Windows NT's sparse on-screen assistance to a Cliffs Notes version of a real help system.

2 Program Manager and File Manager are nearly identical to their counterparts in Windows 3.x.

3 Except for minimized programs, the desktop remains bare; you can't drag files or apps onto it.

4 You can safeguard directories and files by granting selective access with Windows NT's advanced security features.

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Safety First

Microsoft's goal for Windows NT was to build as stable and secure an operating system as possible, one that could be easily revised to work with computers based on a wide variety of processors. Besides the version for Intel-compatible systems, there are editions for systems based on RISC processors including Alpha, MIPS, and PowerPC. (Windows 95 runs on Intel systems only.)

Windows NT Workstation 3.51 is intended as a desktop operating system for sophisticated end users, but its design resembles that of network-oriented operating systems such as UNIX. (Microsoft also offers Windows NT Server, a version specifically designed to run an organization's networked file server rather than a user's own PC.) The OS's internal architecture isolates various processes and monitors them carefully, which helps prevent an errant app from conflicting with other running programs, causing data loss, or crashing the OS altogether.

Like OS/2, Windows NT lets you multitask Windows 3.*x* applications in separate Virtual DOS Machines. Each VDM runs in a separate, isolated memory space. The advantage of this method is that when a single 16-bit application crashes, it doesn't affect other applications that are running. By contrast, Windows 95 piles all 16-bit programs into a single memory area, where they're more likely to wreak havoc.

Windows NT also offers security features more typical of a network than a desktop operating system. Whether or not you're connected to a network, you can password-protect your entire Windows NT environment, preventing hackers from gaining access to your PC. You can also set up varying levels of access for different users and groups, granting yourself unbridled access to all directories and files, but limiting others to certain areas of the hard disk.

Unfortunately, Windows NT's safety-conscious approach limits its compatibility. DOS and Windows 3.*x* apps that try to access your PC's hardware directly, or execute illegal instructions, cause problems. Games, for instance, which often try to access the video subsystem directly, may run poorly or not at all—sorry, Doom fans—and most communications packages (with the exception of Delrina's WinFax Pro) won't work.

While Windows NT does support a respectable range of PCs and peripherals, it lacks Windows 3.*x*'s nearly universal level of support—or even Windows 95's quickly rising level. Microsoft publishes a voluminous list of PCs and peripherals that have been successfully tested with Windows NT; it's included in the Windows NT package and is also available from various online sites.

New Technology, Old Look

For all its sophisticated guts, Windows NT Workstation 3.51's user interface is far from cutting edge. Since its interface is nearly the same as the aging one used by Windows 3.*x*, it suffers from nearly all of that operating environment's innumerable usability problems. Besides lacking features such as the Start button and taskbar, it offers no Plug and Play hardware installation, TAPI modem configuration, wizards, or many of the other enhancements that make Windows 95 more usable than Windows 3.*x*. It also retains Windows 3.*x*'s nasty practice of treating program launching and file management as two separate, unrelated tasks.

Overall, our testers deemed Windows NT much less usable than the Mac OS or Windows 95, and just slightly more hospitable than OS/2 Warp. "Windows NT only makes sense because it works like something I've already climbed the learning curve on," commented tester Robert Cordingley, expressing a sentiment common among our testers with some Windows 3.*x* background.

The on-screen help garnered especially merciless criticism, both for its terse, technical style and for the fact that no single place offers help on every aspect of the OS. Tester Jonathan Wald called it "a Cliffs Notes version of help: general information that didn't actually help me get anything done."

Microsoft is working on an upgrade—dubbed the Shell Update Release—that will give Windows NT a Win 95–like face and TAPI support, although just how greatly it will affect Windows NT's usability remains to be seen. See this issue's *Top of the News* section for an early preview.

WHY I SWITCHED TO WINDOWS NT

My plan wasn't to become a Windows NT user. In fact, I intended to stick with Windows 3.x until Windows 95 became available. But in January 1995, I was preparing to buy a new PC and had read such good things about Windows NT that I decided to get both Windows for Workgroups and NT installed on it.

Comparing the two, I immediately noticed that Windows NT was more stable and multitasked applications with fewer problems. Using Windows for Workgroups, I felt constrained when I wasn't able to run more than one processor-intensive program at a time. With NT, it's been such a relief to not have to worry about system resources anymore, or that a bad application would bring down the entire PC.

It is true that some of my 16-bit multimedia and game applications don't work well with NT. Also some Windows 95 features aren't yet available in NT 3.51: TAPI, for example, and the Windows 95 interface. Still, since most Windows 95 applications also run under Windows NT, I finally have plenty of 32-bit software to choose from, such as Microsoft Office 95 and CorelDraw 6.0.

User: Linda L. Rosenbaum, assistant controller, director of tax and accounting policy, White Plains, New York
PC: IBM Pentium-133 with 32MB of RAM

JAMES MCGOON

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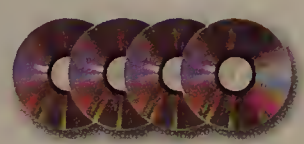

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The Performance Factor

When it comes to 16-bit Windows 3.*x* applications, Windows NT is like a Volvo sedan: It was constructed with safety in mind, not race-car performance. Using Windows 3.*x* versions of WordPerfect, Excel, and Picture Publisher, NT was much slower than either Windows 95 or OS/2; in fact, it took about *twice* as long to finish the WordPerfect tests.

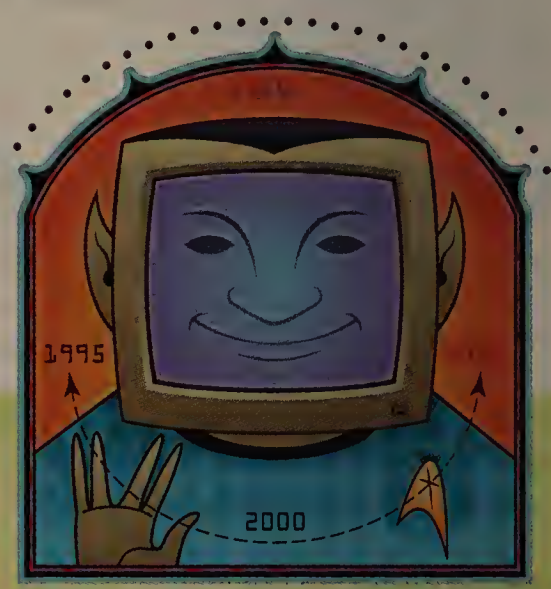
The OS did much better in our 32-bit tests. It completed the word processing and spreadsheet sections—using Word 95 and Excel 95, respectively—nearly as quickly as Windows 95, and it ran the graphics tests using Photo-Paint 6.0 around 30 percent *faster* than Windows 95, probably by handling large blocks of RAM more efficiently.

Until recently, 32-bit apps for Windows NT have been rare. However, Microsoft has decreed that to earn a Designed for Windows 95 logo, most Win 95 programs must run under Windows NT as well—a clever marketing ploy that guarantees a rapidly growing library of Windows NT programs.

Weighing Your Decision

How do you decide if today's Windows NT is for you? If you're looking for a more friendly environment than what Windows 3.*x* offers, don't want to worry about your hardware and software compatibility, and want to eke fast performance out of 16-bit Windows 3.*x* applications—the current version of Windows NT won't fit the bill.

On the other hand, if you're in a business in which even minor data problems can lead to unhappy customers and lost revenue—and you have a fast PC with at least 16MB of RAM—you should consider Windows NT. And if you're an early adopter of a PC based on Intel's Pentium Pro processor, NT may be especially attractive; early tests indicate that its fully 32-bit design may harness the Pentium Pro's power better than Windows 95, which retains some 16-bit code.



DESKTOPS OF TOMORROW

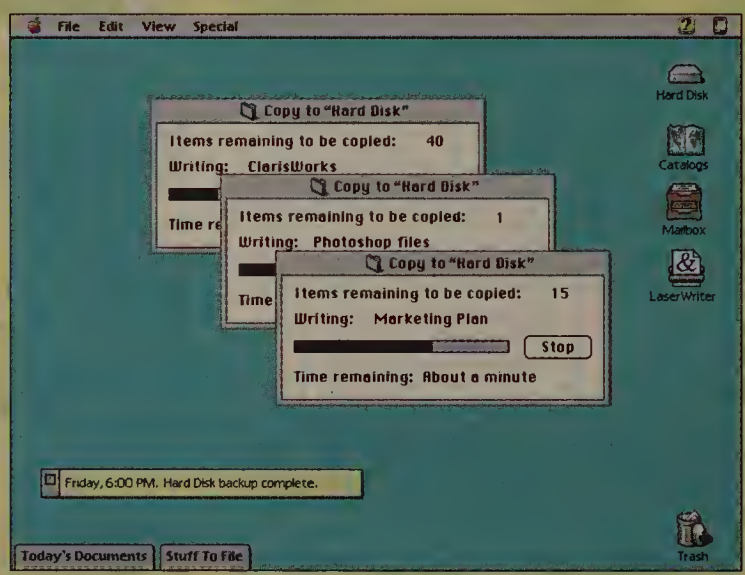
Curious about what the future holds for your favorite operating system? As usual, software developers are not entirely forthcoming about their plans, but here are some quick previews.

In coming months, some Windows 95 enhancements, such as support for ISDN, will appear as downloadable add-ons rather than standard components. Beyond that, Microsoft has also acknowledged Memphis and Nashville, two projects devoted to Windows 95 development. Don't look for these technologies to turn into shipping products before 1997 or so.

The next release of Windows NT, sometime early this year, should add a Windows 95–style interface. The next *generation* of the OS, however, is a project code-named Cairo that may appear in 1997.

IBM says that recent rumors of OS/2's imminent demise are premature, and that it's simply planning to focus on the corporate market, where OS/2 has found its greatest acceptance. The company refuses to discuss its specific plans, though, except to acknowledge that it's working on an OS/2 version for computers built around its PowerPC microprocessor. Big Blue also says that a Warp upgrade that can run Windows 95 applications is a possibility if users demand it.

By late 1996, Macintosh users should get their hands on Copland, the next version of the Mac OS. In order to maximize the performance of the PowerPC RISC processor, this OS will run only on PowerPC-based Macs. Copland will also feature more robust multitasking and a fully customizable interface.



The Mac OS will get preemptive multitasking and a customizable interface with its next release, code-named Copland.

Technologies to Watch For

In all of these operating systems, three technologies are likely to play a growing role: Objects, agents, and communications.

Object-oriented design is already apparent in such features as Windows' OLE 2.0 integration and OS/2's interface. Microsoft's Cairo is expected to to go further, using Object File System, treating everything stored on a hard disk as objects that can be mixed, matched, and integrated. Also planned for Cairo is Network OLE, a version of OLE that can create communications links between applications running across a network. Apple's Copland will support OpenDoc, a competing standard with similar features.

Agents are system utilities that run automatically in the background, such as the ones that handle disk defragmentation and compression in Microsoft's Plus for Windows 95. Both Microsoft and Apple plan to add more agents to future versions of their operating systems; among the possibilities are ones that warn you of potential hardware failures before they occur.

As for the growing importance of communications, Microsoft says that additional Internet tools will be among the most important parts of Nashville, and Apple plans to provide Internet connectivity with Copland. And while IBM declines to be specific, its purchase of Lotus may signal a move to integrate Lotus's Notes groupware and e-mail package more closely with OS/2 Warp.

—Peter D. Varhol

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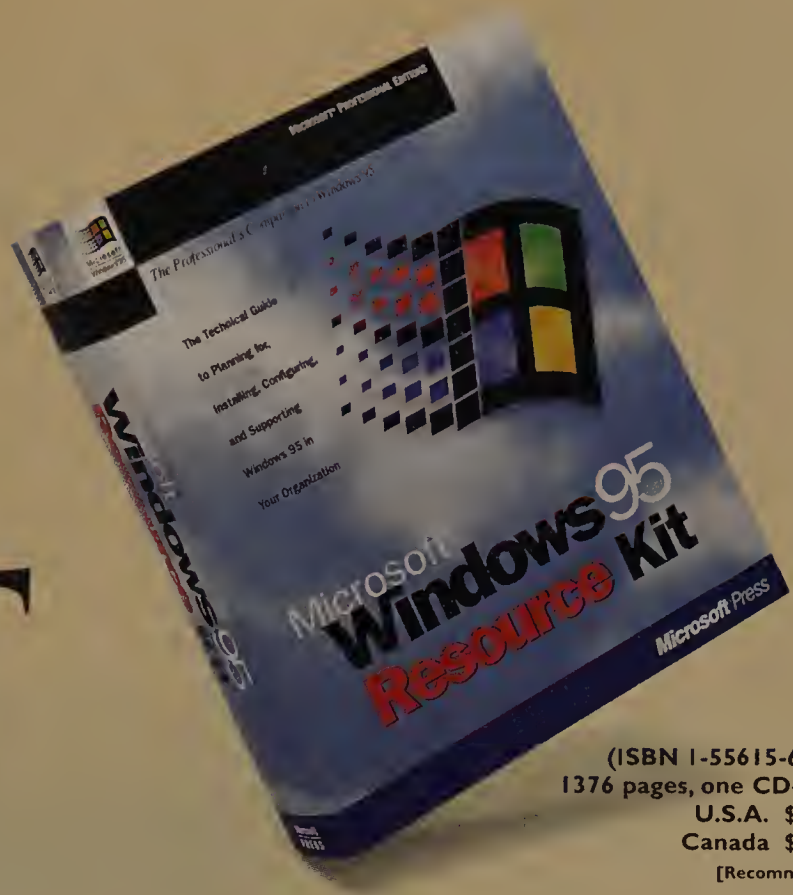

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OS/2 WARP

Another Route to PC Productivity?

PROS: Customizable object-oriented design, includes excellent software bundle, multitasks 16-bit programs well

CONS: Haphazard usability, limited application support, somewhat clouded future

THE BOTTOM LINE: Big Blue's operating system retains some strengths, but its outlook isn't good in the wake of Windows 95. *IBM, 800/342-6672*

Ask an OS/2 devotee why they favor IBM's operating system over Microsoft's and you'll likely get a flurry of answers. OS/2 Warp 3.0 fans find a lot to like in this operating system, ranging from its object-oriented design to the simple fact that it gives users a choice in a market increasingly dominated by Microsoft's wares.

OS/2 may have made only a tiny dent in Windows' market share, but some of its virtues are undeniable, especially when compared to Windows 3.*x*, its traditional competition. OS/2 Warp offers better multitasking of DOS and 16-bit Windows applications than Windows 3.*x*, it features more bundled software, and it provides a more consistent user interface. But now that Win 95 has appeared—sporting some features that OS/2 Warp fans will instantly recognize—IBM's operating system has an even tougher row to hoe than before.

Welcome to the Workplace

OS/2's basic environment, the Workplace Shell, looks a lot like the Windows 95 and Macintosh interface, complete with windows, folders, and icons that can represent programs or documents. The most noticeable benefit of OS/2 Warp's oft-praised object-oriented interface is that Warp treats the elements on your desktop in a predictable manner. For instance, right-click on anything in the Workplace Shell—including programs, files, folders, and the desktop itself—and its Notebook pops up, a well-organized tabbed dialog box that gives you control over every option for that item.

Customization is another OS/2 strength: It lets you specify different colors, fonts, and other trimmings for each folder—something that no other system here lets you do. In OS/2 Warp you can add your favorite applications to the Launchpad (a floating icon bar that resembles Starfish Software's Windows utility Dashboard), and you can even create multiple Launchpads for different purposes.

You can also fine-tune how OS/2 manages memory to optimize performance of the applications you run—though this process requires typing in DOS-like commands and is not for the faint of heart.

OS/2 Warp comes bundled with IBM's BonusPak, an unusually extensive collection of utilities and productivity tools. Besides typical applets, such as a terminal program, you also get unexpected goodies such as a basic spreadsheet and a real (if entry-level) word processor, complete with spelling checker. You also get a serviceable personal information manager, a simple multimedia editing utility, and Person to Person, which lets multiple OS/2 users collaborate on documents over a network. OS/2 Warp Connect, a network-oriented version, provides everything in Warp's standard edition, plus peer-to-peer local area networking software and Notes Express, an entry-level version of IBM/Lotus's groupware package.

Usability Blues

Once they spent some time with OS/2 Warp and grasped its object-oriented philosophy, our testers appreciated such features as its right mouse button menus. By a narrow margin, they also gave it the high-

WHY I SWITCHED TO OS/2 WARP

User: Carolyn Kolaz, training manager, Mount Clemens, Michigan
Computer: Dell Dimension Pentium-90 with 16MB of RAM

At work, I'm a Windows user. When I'm on my own time, I switch to OS/2 Warp. The ability to jump back and forth between thoughts and interruptions is a necessity in both life and computing, and OS/2 is the only software I've found that allows me to do just that.

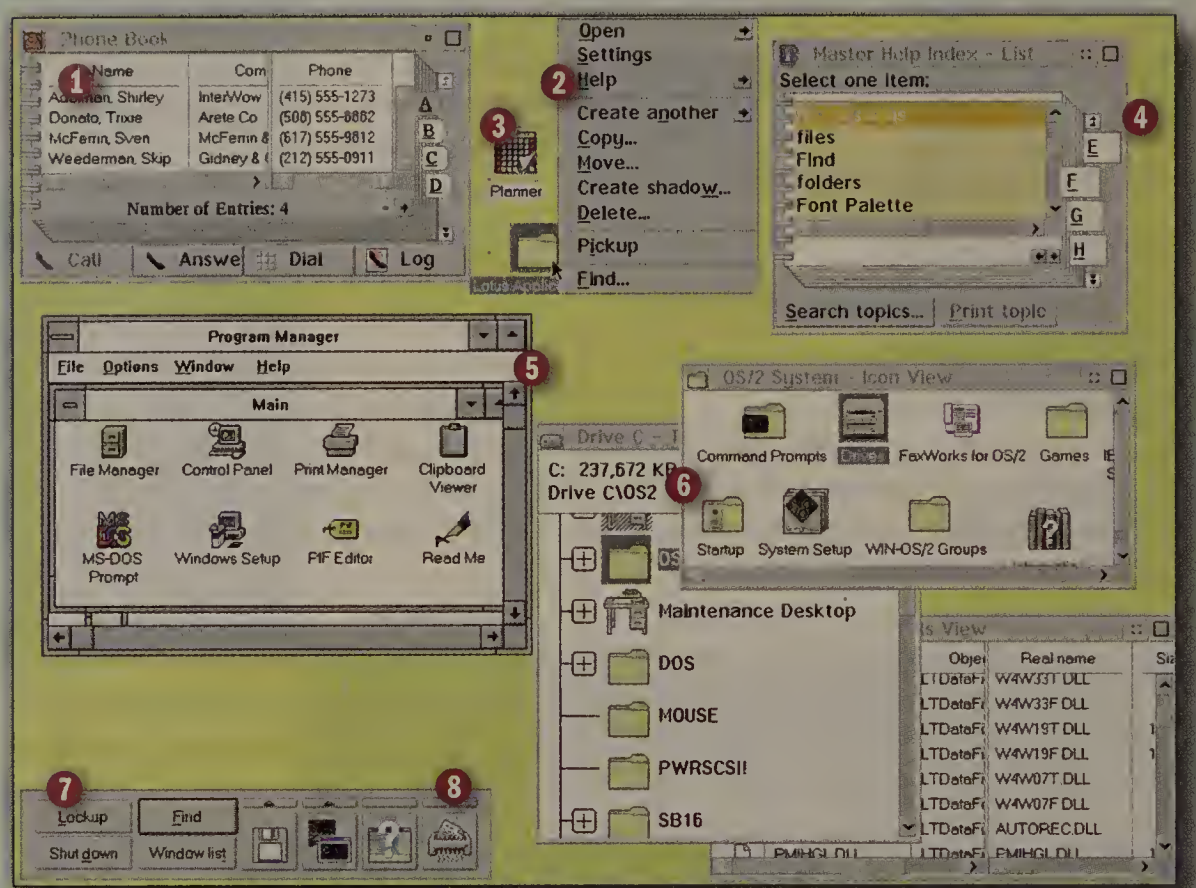
Warp's multitasking capability is the best I've ever seen. I can run a tape backup and still have access to the floppy and hard disk drives—even the drive being copied. It's also easy to customize: For instance, you can give a memory-hungry application the maximum amount of memory available.

One problem is that it's hard to find tips or chat with colleagues about OS/2, since it's not as mainstream as Windows or even the Mac. Even more important is the limited amount of native software. Right now I use a combination of OS/2, Windows 3.x, and DOS applications.

But I have high hopes on the software front, especially with IBM's recent purchase of Lotus. I believe Warp is here to stay, and I'm excited about the future.

JON MURESAN

How You Work With OS/2 Warp



1 Unlike the other operating systems here, Warp comes with plenty of real productivity software, such as a basic PIM.

2 Clicking the right mouse button provides a menu of configuration options for any object.

3 Folders, files, and Shadows (pointers to other items) can sit on the desktop.

4 Users had trouble finding what they needed to know from the often cryptic on-screen help.

5 You can run Windows and DOS programs directly from OS/2 or from Program Manager.

6 Configurable windows provide a variety of views of your folders, programs, and data files.

7 Launchpad is a handy, customizable icon bar for favorite apps.

8 OS/2's Shredder makes deleting files simple, but getting them back is a challenge.

est marks for ease of desktop customization, such as the way it lets you change color schemes by dragging them off a palette onto the desktop. But because you use the right rather than the left mouse button, it caused confusion at first.

Overall, newcomers from Windows 95, Windows NT, and Mac OS all ranked OS/2 as the least usable of the operating systems in our Test Center. In almost every case, the testers complained about how difficult it was to accomplish everyday tasks. Many of them fell back on Windows 3.*x* tools such as the File Manager, which Warp offers as part of its ability to run Windows 3.*x* programs, even as they wondered why OS/2 melds its own interface with that of Windows 3.*x*.

For instance, even though Warp lets you delete files by simply dragging them to its Shredder icon, by default it can't recover a file that you mistakenly purge. It also does not provide a warning if you try to delete vital system files, which led one tester to unwittingly destroy the installation by dragging part of the OS itself to the Shredder. Even after you turn on its undelete utility, you need to jump to a DOS-style command-line prompt and type in an instruction to restore deleted files; there's no equivalent to the way Windows 95 and the Mac OS let you simply drag deleted files out of the Recycle Bin or Trash.

OS/2 Warp has several more usability flaws. When you minimize a running application, it disappears, by default, into a special folder instead of appearing as an icon on your desktop; this vanishing act sometimes caused our testers to unwittingly leave upwards of a dozen programs running at a time. They also tended to be baffled by OS/2 Warp's Find utility, which locates files on your hard disk and lets you launch them with a double-click—but doesn't tell you where they reside. (You can find out from a submenu in the file's Settings dialog box, but it's neither a quick nor intuitive process.)

Testers' sentiments about OS/2's on-screen help and tutorial were mixed at best: It garnered fewer brickbats than Windows NT's, but fell far short of the nearly universal praise given to the Mac OS and Windows 95 on-screen help. Warp's idiosyncratic terminology—such as the way it refers to nearly everything as "objects"—often got in the way of finding quick solutions to problems. "You need help just to use Warp's help," said usability tester and OS/2 veteran Robert Cordingley.

OS/2 Warp Doesn't Do Windows 95

OS/2's ability to preemptively multitask DOS, Windows 3.*x*, and native OS/2 applications once led IBM to tout it as "a better Windows than Windows." That claim fell by the wayside with the introduction of Windows 95: Warp simply isn't able to handle 32-bit Windows 95 programs.

It runs the vast majority of Windows 3.*x* software well, though, and you can choose either to launch single Windows apps from the OS/2 desktop or run a full-blown Windows 3.*x* session with Program Manager in full screen mode. But in either case, OS/2 Warp gives you more multitasking options than Windows 95: You can tell it to run Windows programs in isolated VDMs, so one errant program won't crash others, or run several Windows applications within a single session—a somewhat riskier method, but one that eats up fewer system resources.

One user unwittingly destroyed the OS/2 installation by dragging part of the OS itself to the Shredder.

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OS/2 Warp aficionados argue that it offers a more stable computing environment than Windows 95, but that wasn't apparent in our usability tests: It crashed far more often than any other OS on multiple PCs including an IBM system that came with Warp preinstalled. Also, unlike Windows 95 and Windows NT, Warp uses a single queue to manage all input from the mouse and keyboard. So if an application fails to retrieve input meant for it from the queue, all other running applications are forced to wait, which can freeze the OS.

Despite its unorthodox qualities—or perhaps because of them—Warp strikes a deep chord in some users.

Defining Warp Speed

If you want to run 16-bit Windows 3.*x* programs quickly, OS/2 Warp certainly competes with its rivals. It provided the fastest overall performance in our tests of Windows 3.*x* versions of WordPerfect, Excel, and Picture Publisher, though Windows 95 was just two seconds slower overall (which is statistically insignificant). OS/2 Warp was also competitive in the word processing and graphics portions of our 32-bit application tests; in fact, using Ami Pro, it offered much quicker word processing than any of the other operating system/word processor teams we tried.

Its 32-bit spreadsheet performance was another story, though. Windows 95 completed our spreadsheet benchmark in 24 seconds using Excel 95, but OS/2 Warp, paired with the OS/2 version of 1-2-3, took a mind-numbing 28 *minutes* to accomplish the same tasks. As Lotus acknowledged, these out-of-whack results are probably due more to the antiquated design of the current OS/2 version of 1-2-3 than to any fundamental problems with the OS itself. (Long-anticipated upgrades to all of Lotus's OS/2 applications should begin to appear during the first quarter of this year.)

But the fact that 1-2-3 for OS/2 is archaic is symptomatic of OS/2's single biggest limitation: a relative lack of up-to-date, built-for-OS/2 applications. The Computer Select database of software packages contains listings for approximately 3400 OS/2 applications—far from a pittance, but dwarfed by the 11,500 Windows 3.*x* and 6400 Macintosh packages catalogued. Like Windows NT, OS/2 also suffers from a limited supply of available drivers for peripherals such as graphics cards—though with Warp 3.0, IBM has beefed up the driver library and taken steps to ensure that the proper ones are installed.

OS/2 at the Crossroads

When 16-bit Windows applications dominated the market, OS/2 Warp's real strength was its ability to run virtually any PC–compatible application, whether it was designed for DOS, Windows, or OS/2. But unless IBM releases an OS/2 upgrade that is able to run 32-bit Windows applications—which the company says it has no current plans to do—the disparity in application support between Windows and OS/2 will continue to grow. That problem, combined with OS/2 Warp's lukewarm reception by our usability testers, indicates that this is still not an operating system for everybody.

OS/2 Warp 3.0 remains a viable option, however, if you like to tinker with a highly customizable OS and you don't demand a tremendous selection of off-the-shelf applications. High-quality programming tools for Warp are available, and it has found some success among businesses that develop their own software for in-house use. Despite its unorthodox qualities—or perhaps because of them—its interface strikes a deep chord in some users: OS/2 Warp enthusiast Cordingley said the system "thinks the way I think." But his overall assessment is apt: "It's not an end-user operating system; it's a nerd operating system."

MAC OS

How the Other 10 Percent Lives

PROS: Top-notch interface and on-screen help, great platform for graphics work

CONS: Limited multitasking capabilities, sparse collection of bundled utilities, uneven speed in our tests

THE BOTTOM LINE: Apple's groundbreaking OS still excels in ease of use and at graphics tasks, but no longer stands alone. *Apple Computer, 800/472-4342 ext. 150, 408/996-1010*

"Windows 95," according to a gag making the rounds in Mac circles, "equals Macintosh 84." This put-down isn't completely without merit: Macintosh users have enjoyed an intuitive, mouse-driven operating system with Plug and Play–style hardware installation since the dawn of Mac-kind, years before the existence of Windows 3.*x*—as any Mac fan will be glad to remind you.

As indicated by our usability test results, Windows 95 has made several giant leaps toward giving users of Intel-compatible systems an operating system that matches the Macintosh's user friendliness. But overall our testers still gave the Mac OS their highest marks, judging it as slightly more usable than Windows 95 and much superior to OS/2 Warp and Windows NT. The Mac OS might have lost most of its once-imposing edge, but the roughly 10 percent of personal computer users who use Macintoshes still enjoy some advantages—especially users who are interested in graphics, which remains a Mac specialty.

We tested version 7.5.2 of the Mac OS, which runs only on Power Macintosh models based on a PCI bus; other Macs use version 7.5.1, which is essentially the same in interface and features.

The Sincerest Form of Flattery

One measure of the Macintosh interface's success is the degree to which both Windows 95 and OS/2 Warp mimic it. It's obvious, for instance, how much Windows 95's Recycle Bin and OS/2's Shredder owe to the

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Mac's Trash, which introduced the concept of drag-and-drop, recoverable file deleting. OS/2 Warp's Workplace Shell and the Windows 95 Desktop are clearly modeled on the Mac OS's Finder, the first mainstream interface that lets you manage folders, programs, and documents by dragging them around in customizable on-screen windows.

In most respects, the Mac OS and Windows 95 have reached something close to a state of parity.

Still, neither Windows 95 nor OS/2 has quite matched the Finder's simplicity and logic. For instance, Windows 95 shows vestigial traces of Windows 3.*x*'s separation of file and program management in the program menus you get when you click the Start button: These menus differ from the folder-based organization used elsewhere. Similarly, the Mac has never forced you to use DOS-style command prompts, but OS/2 Warp still compels you to use them to accomplish fairly routine tasks.

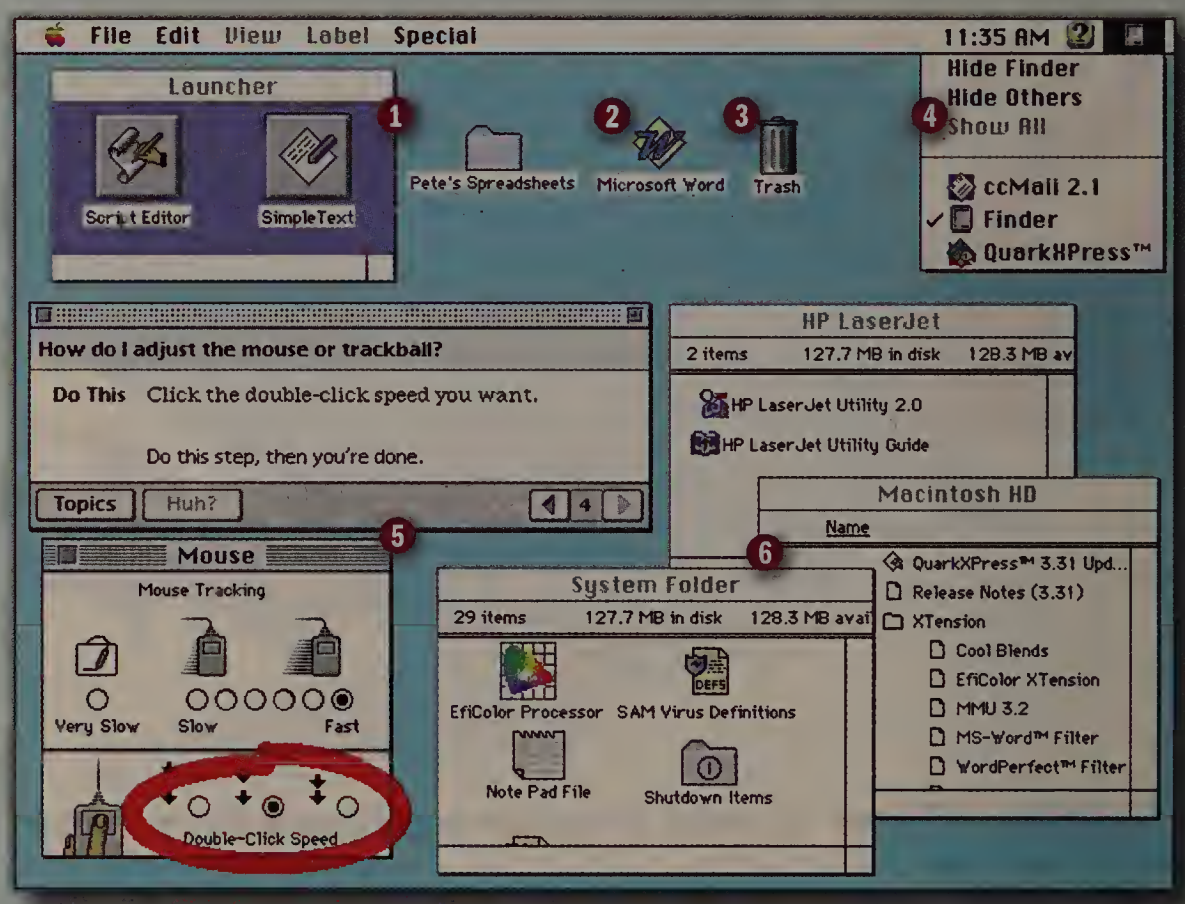
In many instances, the Mac OS Finder's intuitive design and single, integrated set of tools helped our usability testers figure out how to perform tasks in that operating system more quickly than with the others. "I want the same basic techniques to work everywhere," said tester Jonathan Wald, who's used a Macintosh for eight years, "and I find that to be true with the Macintosh—much more than with other systems."

Macintosh Guide, the Mac OS's on-screen assistance system, received particularly glowing reviews from most of our testers: "I love the way it walks me through each step and draws on the screen to point things out," said usability tester Jan Altman. "There's no way I can misunderstand or *not* learn what's going on." Some testers found the on-screen help to be overbearingly friendly and a little patronizing. "I felt like a small child being led by the hand," complained Mark Yeary, an experienced Windows NT user.

Most tester complaints about the Mac OS stemmed from features that are similar to some Windows 3.*x* and OS/2 features, but are handled slightly differently in the Macintosh. Seasoned PC users tended to fumble at first with the Mac OS's pull-down menus, which—unlike Windows and OS/2 drop-down menus—only stay open as long as you position the mouse pointer on them and keep the mouse button pressed. Similarly, the way the Mac OS uses a single menu bar that's permanently anchored across the top of the screen caused some confusion; OS/2 and all versions of Windows locate different menus across the top of each application's windows. Windows 95 and Windows NT users also expected to see minimized applications turn into readily visible icons; instead, minimized applications appear as items in a pull-down menu.

Usability testers also generally needed a fair amount of time to figure out how to install and configure a printer using the Mac OS's Chooser, a control center for selecting and setting up printers, network drives, and other peripherals. After users installed the drivers that came with the printer, an Apple LaserWriter, the Chooser displayed a list of LaserWriter models to choose from—but that particular LaserWriter wasn't included on the list. Without exception, the testers could not proceed without consulting the printer's documentation, which told them which driver to select from among the available options. (In fairness, the difficulty was in part due to the drivers rather than the operating system; still, you'd expect things to work more smoothly given that the computer, operating system, printer, and drivers were all Apple products.)

How You Work With the Mac OS



1 Launcher is a docking station for favorite programs—not unlike Warp's LaunchPad.

2 Disks, programs, documents, folders, and Aliases (pointers to other items) can appear on the Mac OS desktop.

3 Trash is the original easy-to-use file disposal system.

4 Minimized applications appear only when you click the menu bar to reveal a pull-down menu.

5 Macintosh Guide on-screen help answers questions by stepping you through common tasks; red circles show which controls to use.

6 The Mac OS's Finder lets you manage programs, documents, and other files with simple, consistent tools, including customizable window views.

It's also worth noting that even the most intuitive of computer interfaces can intimidate a first-time user. One celebrated example of the Mac OS's friendliness is the way it lets you delete files by dragging them to the Trash icon, then restore them by simply dragging them out if you change your mind. But one tester with an OS/2 background shied away from touching the Trash: He didn't know if double-clicking it would let him retrieve files that he had deleted, or if it destroyed them forever.

Mac Economics

If you currently use an Intel-compatible PC, of course, the decision to move to the Mac OS involves more dramatic changes than adopting Windows 95, Windows NT, or OS/2 Warp. Buying into the Mac universe entails changing both your software and hardware: You need an entirely new computer from Apple or a Mac clone vendor such as Power Computing, one that may not work with all your PC's existing peripherals.

The Mac has long had a reputation as a rich person's computer—a stigma that persists even after Apple slashed prices to compete better with Intel-based systems. (Note that the tempting Power Macintosh prices you may see quoted in ads usually don't include such vital components as a keyboard and monitor—or, in some cases, a graphics adapter.) Mac peripherals have also traditionally been more expensive than their counterparts for PC systems, though the difference has narrowed in many instances.

Leaving the Intel-compatible world for a Mac also means running Mac OS–compatible applications rather than DOS and Windows programs. You *can* run Windows 3.*x* applications by using emulation software or add-in cards; Apple also offers a model with built-in DOS and Windows compatibility. But since even the fastest Macs can't handle Windows at anywhere near the speed of a Pentium system and no Mac can currently run Windows 95 adequately, it's pointless to move to the Mac OS if your primary interest is to run Windows programs.

While Apple once bundled such groundbreaking applications as MacWrite, MacPaint, and HyperCard with every Mac, its current lineup of standard applets and accessories is a little sparse compared to OS/2 Warp and Windows 95. You get an e-mail package, a simple text editor, and the ability to play back QuickTime video clips; but it offers no paint package or terminal program. Any Mac system you purchase may supplement the basic Mac OS features with bundled applications that aren't officially part of the OS, such as At Ease, a special user interface designed for computer neophytes.

As for third-party applications, the Computer Select database contains listings for roughly 6400 Mac software products—about half the number of Windows 3.*x* packages, but almost twice that available for OS/2. The Mac has reached a critical mass of software support that OS/2 hasn't attained: In most categories you can select from several solid, frequently updated packages.

An Artist's Best Friend

If your computing interests lie in desktop publishing, animation, or other graphics-oriented applications, you'll appreciate the particularly appealing selection of packages available for the Macintosh. Even today, such popular cross-platform graphics packages as QuarkXPress and Fractal Design Painter are generally available in new Mac versions before their Windows editions ship. Apple continues to pioneer new graphics technologies, such as QuickDraw 3D, a real-time, three-dimensional rendering extension to the Mac OS that's available for downloading (and is bundled with Macs

WHY I SWITCHED TO THE MAC

User: Michael Southard Jr., wireless system engineer, Plano, Texas
Computer: Power Macintosh 7500/100 with 16MB of RAM

My move from the Windows platform to the Mac happened in the fall of 1992. It seemed like every time I tried to perform even a basic function in Windows 3.1, such as multitasking with just two apps, it would crash. I had always considered the Mac a toy, but after spending about 30 minutes with one, I was pleased by the simplicity of the interface and the ease with which the system hardware and software worked together. So I sold my 486/33 and purchased a Quadra 700.

Since I switched to the Mac, I haven't had to worry about resource limitations, whether all my drivers are compatible, or fussing with hardware configurations. If I want to attach a modem, I do, and it works. With my Windows PC, I tended to spend more time troubleshooting and less time working.

For the most part, the quality of Macintosh-compatible software is excellent. I use both Microsoft Office and WordPerfect as well as Quicken, Mathematica, and Netscape. One thing I would like to change is the operating system itself. I currently own a PowerMac, and most of the Mac OS isn't written in native PowerPC code. While this lets me run older software, it puts a damper on the PowerPC's capabilities.

A lot of people have been saying lately that the Mac is doomed because of Windows 95. But I feel that the Mac's biggest enemy is not Microsoft or Intel, but Apple itself. From lax marketing campaigns to critical product shortages, the company is constantly dropping the ball. However, when it comes to being productive with a personal computer, nothing from Microsoft beats the Mac.

REID HORN

that are aimed at graphics professionals).

The Mac's nature as a platform for artistic types was demonstrated in the results of our speed tests. For these we used a 100-MHz Power Macintosh 7500; like the 90-MHz Pentium PCs on which we tested the other operating systems, this Power Mac is a fairly typical power user's machine (though at roughly $3500 for our configuration, a pricey one in comparison to most Pentium PCs). The combination of the Mac OS and Photoshop far outpaced Windows 95 and Windows NT (using Corel Photo-Paint) and OS/2 Warp (using SPG's Colorworks), completing our set of graphics tasks in well under half the time of any other 32-bit OS.

The Mac's performance in our word processing and spreadsheet tests was much less impressive. Using Word 7.0 for the Mac, it took well over twice as long to finish the word processing tests as Windows 95 and Windows NT (both using Word 95) and more than four times as long as Warp (using Ami Pro). Its spreadsheet speed with Excel 5.0 for the Mac lagged behind that of Windows 95 and Windows NT (both teamed with Excel 95) but came in far ahead of the painfully slow results of OS/2 and 1-2-3.

Cooperation Required

Although the Mac OS was a 32-bit operating system before Windows 95, Windows NT, or OS/2 Warp hit the market, its current architecture lags behind the competition in some respects. Like Windows 3.*x*, the Mac OS uses cooperative multitasking, in which applications can yield the CPU to other tasks but aren't forced to do so by the OS.

As a result, a badly behaved program running in the background can prevent you from working in other applications. Common tasks such as formatting floppy disks also seize complete control of the Mac OS; in contrast, every other OS we tested lets you keep working in another program—a benefit our Mac-experienced testers praised when using the other operating systems. Apple plans to add preemptive multitasking in Copland, its next revision to the Mac OS.

Mac to the Future

Despite the popularity of Apple's Power Macintosh systems, which are based on the advanced PowerPC RISC processor, the Mac OS itself is still primarily engineered for the 680X0 processors used by earlier Macs. Running on a PowerMac, it kicks into an emulation mode that can't harness the PowerPC's true performance. Copland is being designed for the PowerPC from the ground up, and will also feature a new, highly customizable interface; if it ships on schedule by the end of 1996, the Mac just might regain its dramatic lead in usability.

For now, though, the Mac OS and Windows 95 have reached something close to a state of parity, and there's no compelling reason for most PC users to ditch their current hardware in favor of a Macintosh. The reverse is also true: Anyone who has already chosen the Mac over an Intel-compatible PC running Windows or OS/2 Warp probably won't find Win 95 compelling enough to lure them away from their favorite platform.

FEATURES COMPARISON

Four Roads to 32-Bit Power

● = Yes ○ = No
n/a = not applicable

	Windows 95	Windows NT Workstation 3.51	OS/2 Warp 3.0	Mac OS 7.5.2
Standard features				
Street price as of 10/18/95 [1]	$179	$319	$123	n/a [2]
Upgrade from Windows 3.x	$90	n/a	$75	n/a
Processor recommended	486DX	486DX	486DX	68040
RAM recommended (MB)	8	12	8	8 [3]
Minimum hard disk space required (MB)	30	90	35	25
Security on stand-alone PC				
Hide files	●	●	●	○
Grant selective access to files and folders	○	●	○	○
Password-protect PC at start-up	○	●	●	○
Applications supported				
DOS applications	●	●	●	○ [4]
Windows 3.1 applications together in one virtual DOS machine	●	●	●	○ [4]
Each in its own virtual DOS machine	○	●	●	○ [4]
32-bit Windows 95 applications	●	● [5]	○	○ [4]
Applications included				
Backup utility	●	●	●	○
Disk compression	●	○	○	○
E-mail/fax	●/●	●/○	●/●	●/○
Multimedia playback/editing	●/○	●/○	●/●	●/○
Paint program	●	●	●	○
Peer-to-peer network	●	●	○ [6]	●
Personal information manager	○	○	●	○
Spreadsheet	○	○	●	○
Terminal emulation	●	●	●	○
Text editor	●	●	●	●
Service and support				
Free support (days)/toll free	90/○	○ [7]/○	60/○	unlimited/●
Weekday support (hours)	12	24	12	12
Weekend support	○	●	○	○
Fax/online support	●/●	●/●	●/●	○/●

[1] PC World estimate based on mail-order prices.

[2] Preinstalled on PCI systems; upgrade price for version 7.5.1 is $99.

[3] 4MB without QuickDraw GX and PowerTalk features.

[4] Available through software and hardware emulators.

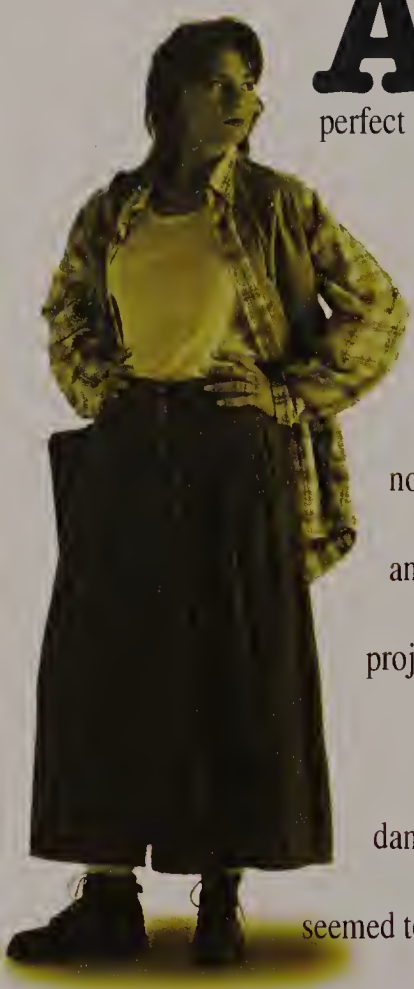
[5] Most Designed for Windows 95 logo-compliant programs must run under Windows NT.

[6] Available in OS/2 Warp Connect.

[7] One free call for setup assistance.

Gateway 2000

Portable PCs



Aurora borealis. The perfect excuse to get away.

Made sure the battery on my Gateway Solo™ S5-120XL multimedia notebook was charged, fueled up the truck and headed north. Second quarter projections could wait.

I watched Mother Nature's display dance across the northern sky. And life just seemed to make sense. Looking at my Gateway Solo S5-120XL multimedia notebook I thought, this machine also makes perfect sense. Think of it. A powerful 120MHz Intel® Pentium® processor, active matrix SVGA color display, 40MB RAM, whopping 1.2GB hard drive, and CD-ROM drive. All the power of a high-end multimedia desktop in a portable package. Who needs more?

A German opera filled the night.

I was deep in thought. Thanks to the swappable CD-ROM drive and integrated speakers, features found on all models of the Gateway Solo multimedia notebook line, my favorite German opera filled the night.

Suddenly I heard hoofbeats.

GATEWAY2000
S O L O

Turning I found myself face to chest with a large white horse.

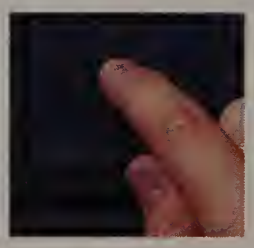
"Hello madam," said the uniformed man atop the horse. "Is that a Gateway 2000 portable? What a coincidence, I have one too!"

Desktop power that fits on a horse.

He reached into his pack and pulled out a Gateway Solo S5-75XL notebook. "My S5-75XL is loaded with a 75MHz Pentium processor, 8MB RAM, and 540MB hard drive. With the 16-bit sound, stereo speakers and a CD-ROM drive, I can use multimedia applications anywhere. Even in the boondocks. And the active matrix color display provides a great view."

More co more

This value-packed system is ideal for the professional person on the go such as myself. And the best part, it fits on a horse, " he said with a smile. "Gateway 2000® is the place to go for great values on portable PCs. And while you can compute anywhere, I must ask you to cease and desist." I gave him a questioning look. He continued, "It's mating season for many of our furry friends and we wouldn't want the glow from your



EZ Pad™ pointing device for easy cursor navigation.

active matrix color display ruining their plans. Thank you madam and enjoy your evening." And with a tip of his hat, off he rode.

My commune with nature over, I found an offbeat diner and stopped in for some food. I felt someone watching me. As I scanned the room, our eyes met.

He was sitting at the counter, a Gateway Liberty™ small notebook in front of him. He looked vaguely familiar. I pointed to my portable and mouthed, "Gateway 2000." He smiled and gave me a thumbs up. "My Gateway Liberty small notebook is way cool," he said, pulling up a chair. "Powerful and light-weight, man. It's just what I need. I'm a poet now. But I used to have a band."

Gateway Solo notebooks are optimized for Microsoft® Windows® 95.

A band!

Memories of him in a silver jumpsuit and platform shoes came flooding back! He'd been plastered all over

I'm telling you, Gateway is just great!

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my bedroom walls for years.

"I'm telling you, Gateway 2000 really takes care of their customers. I can get telephone technical support anytime. And Gateway's values are just out of this world. Hey, you wanna come over to my place and listen to some vinyl?" I had a feeling my adventures were just beginning.

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Windows NT 32 bit mode included	Yes	No	No	No
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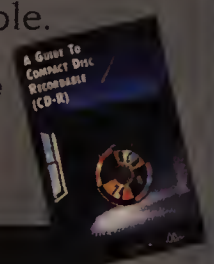

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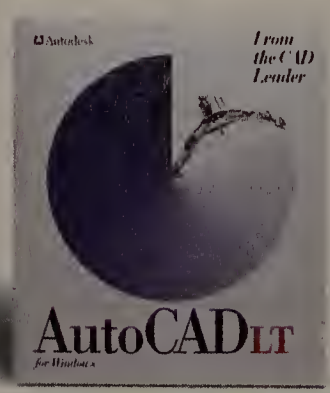

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Directory Assistance on Disc

Whether you're targeting customers or looking up old friends, CD-ROM phone directories can help. Here's how four leading packages stack up.

ADAM COHEN

By Shane Mooney

Locating people—either for business or personal reasons—can be expensive, time-consuming, and frustrating, especially if you have no idea where to start looking. Until recently, if you needed a list of names to launch a new business or to beef up your customer base, or if you simply wanted to track down names and addresses for a class reunion, you had two choices. Either you cracked a phone book and looked up the information yourself, or you paid hefty fees to a professional mailing-list provider, industry consultant, or private eye to do the legwork for you.

Now there's another way to find names and numbers, one that can save you time and money: CD ROM–based phone directories provide the same information a traditional phone book contains, but they let you do things that are impossible with paper-based listings. You can locate almost any business or residential listing in the United States within seconds, and you can export the listings to a contact manager or word processor for use in direct mail or telemarketing campaigns.

We looked at four electronic phone books: American White Pages and American Yellow Pages from American Business Information, PhoneDisc PowerFinder from Digital Directory Assistance, and Select Phone from Pro CD. All four are Windows 3.*x*–based but also run under Windows 95. Select Phone and PhoneDisc also run under DOS and the Macintosh. When you run PhoneDisc under Windows 95, you gain

access to Windows 95 features such as drag-and-drop support and long file names.

Using any of these products is easier than poring over a stack of phone books and less expensive than paying a typical $300 fee to a company like Cole Publications to produce a customized mailing list. But if you rely heavily on demographic data to market your products or services, these products are no replacement for a mailing list produced to your specifications. Although you will find some demographic information, most contain only a bare-bones minimum.

The Phone Book Goes Electronic

American Business Information divides its listings into two products: American White Pages has over 70 million residential listings, and American Yellow Pages contains over 10 million business listings. Although both are inexpensive ($49), that price lets you access only 5000 listings. You must purchase an access code to view more, from $32 for 2500 listings up to $79 for 10,000. (At press time, ABI was preparing to launch the 130 Million Listings Ultimate Phone Book Suite containing business and residential listings, toll-free numbers, and nine-digit zip codes.)

The $99 PhoneDisc PowerFinder contains 100 million business and residential listings. Select Phone, which also costs $99, provides access to 95 million business and residential listings. Both products offer unlimited access and powerful search tools.

The size of their databases requires that most of these products ship on multiple discs. Only American Yellow Pages ships on a single disc; Select Phone, PhoneDisc, and American White Pages consist of five or six discs each. Each disc contains listings for a specific U.S. geographic area. This arrangement can be problematic when you need to search for listings in multiple regions. In American White Pages, you must exit, insert the correct disc, and restart the program. Both Select Phone and PhoneDisc let you swap discs during a single session.

Select Phone by Pro CD

It was a close call, but Select Phone edged out PhoneDisc PowerFinder to earn our Best Buy recommendation. Although both products have powerful search-and-retrieval options, Select Phone's impressive accuracy rating put it over the top. In addition, Select Phone's ability to save search results and its long list of export file types make it the product of choice for the serious telemarketing or direct mail campaign.

How We Tested

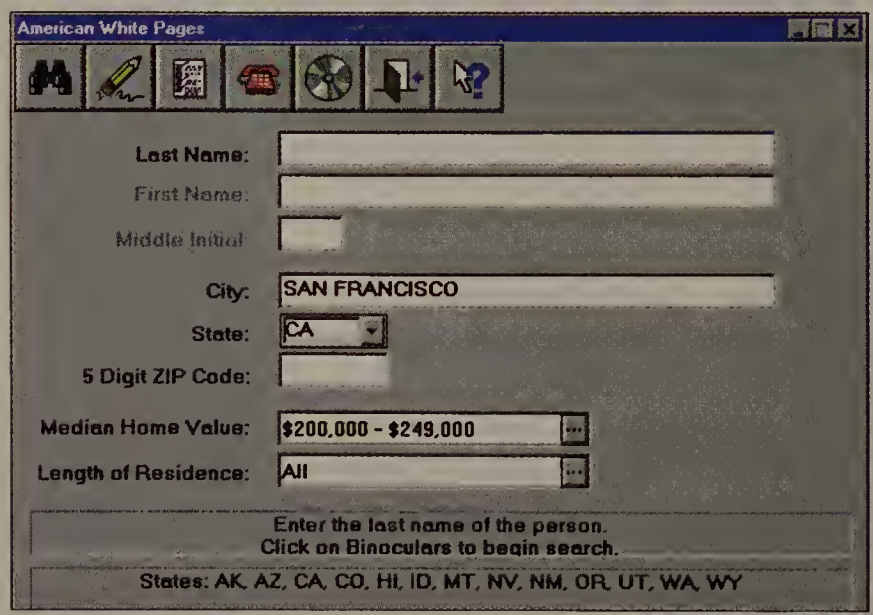
To evaluate these products, we focused on accuracy, ease of use, and search-and-retrieval capabilities. The Best Buy goes to Select Phone for excellence in all three categories. Although it has 5 million fewer listings than PhoneDisc, its 89 percent accuracy rating surpassed all the other directories'. Extensive search capabilities and a long list of export file formats put it over the top.

Although it's difficult to say which product is the most accurate without calling every number listed, we tested the accuracy by verifying a number of listings at random.

We located the latest hard-copy phone books for five metropolitan areas across the United States: Brooklyn, Pittsburgh, El Paso, Denver, and Seattle. We selected pages at random and from them chose 200 residential and 200 business listings. We then compared the listings in the phone book with what the disc listed. If the disc had all the information for a listing correct, it received a point. If a listing was missing altogether, or if neither the phone number nor the address was listed correctly, the disc received no points. However, if the listing contained the correct phone number but wrong address (or vice versa), it received half a point. To determine overall accuracy for Select Phone and PhoneDisc, which have both residential and business listings, we averaged the results for the two types of listings.

Shane Mooney is a freelance writer based in California.

For more information about all products in this article, circle reader service no. 904.



AMERICAN WHITE PAGES INCLUDES DEMOGRAPHIC DATA such as median home value and length of residence along with addresses.

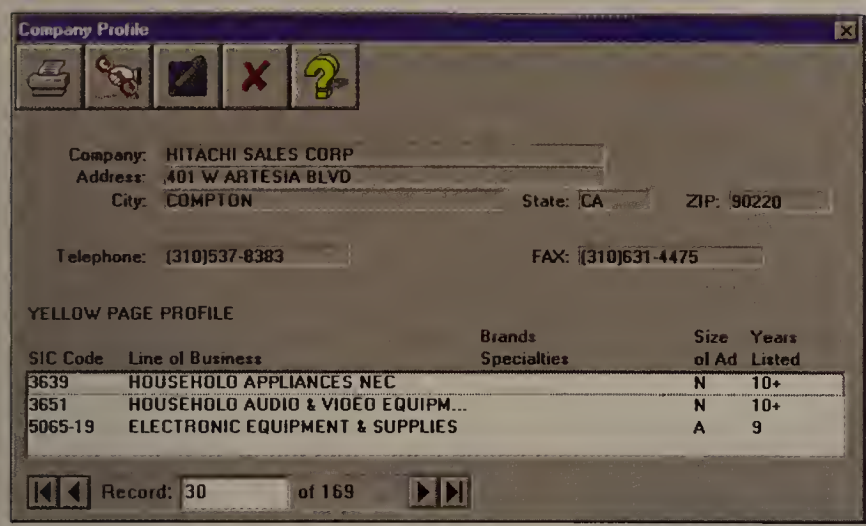
American White Pages

PROS: Easy-to-use interface, includes demographic data

CONS: Can't search by street address or phone number, 5000-listing limit, must print or export after each search

American White Pages got off to a bad start by failing to find the most important of names: mine. From there, things got worse. Although AWP is inexpensive, you pay in other ways. You can't search by address or phone number, and you can access only 5000 listings for the $49 purchase price. More serious, however, is the directory's poor accuracy rating of 75 percent.

But American White Pages' simplified interface helps you conduct searches with ease. You can search by name, city, state, and zip code, as well as by the number of years a person has spent at the current address and by median home value. This information can prove useful for targeting customers based on income level. The



AMERICAN YELLOW PAGES RETURNS MORE THAN A COMPANY NAME and address. It also provides the fax number and line of business.

only downside: The directory doesn't differentiate between home owners and renters, so you can't target one group or the other.

AWP's exporting and printing capabilities are less than adequate. You must individually select the listings you want to export, and you have no control over how they appear on the printed page. In addition, you can export data only in comma-delimited, tab-delimited, and fixed-length file formats. While AWP's low price and ease of use make it appealing, its poor accuracy rating and inability to search by address or phone number limit its usefulness. If you need flexible search options and the ability to export data to multiple formats, American White Pages is not for you. *American Business Information, 800/555-5666* **Reader service no. 654**

American Yellow Pages

PROS: Easy-to-use interface; includes company fax numbers and years in business
CONS: Can't search by street address or phone number, 5000-listing limit, must print or export after each search

At $49, American's phone directories are the least expensive of the bunch, but American Yellow Pages suffers from the same limitations as its residential counterpart. For starters, you can't search by phone number or street address. Even more serious is the limited number of listings that $49 buys you—after 5000, you must pay to view. Despite its ease of use and passable accuracy rating of 83 percent, these restrictions handicap an otherwise useful product.

Conducting a search in AYP is relatively easy. You can search by business heading, such as accountants or real estate brokers, or by city, county, state, zip code, or company name. A nice touch: For each field except company name, AYP offers a predefined list of choices. For example, if you're not sure of the business heading under which a particular company would be listed or the correct spelling of a town, you can select the appropriate choice from a list.

AYP also provides information not found in the other products, In addition to listing the name, address, and phone number, AYP returns a company's fax number and the size of its ad in the local yellow pages. Another unique feature, the Industry Count command, allows you to display a summary view of an industry by state. For example, you can determine the number of video stores in the United States, broken down by state. This command also returns the average number of employees in these companies.

But American Yellows Pages suffers the same exporting limitations as American White Pages. First, you must individually select each record you want to print, and you can select only 100 listings at a time, which can be cumbersome if you're working with many listings. Furthermore, AYP exports listings all in uppercase and provides only three export file formats (comma delimited, tab delimited, and fixed length), so you'll have to do quite a bit of tweaking to get the data into a usable format.

If you plan to use American Yellow Pages as a simple replacement to the paper-based version, then its low price and ease of use are appealing. However, if you'll be performing serious telemarketing or direct mail campaigns, American Yellow Pages just doesn't cut it. *American Business Information 800/555-5666* **Reader service no. 655**

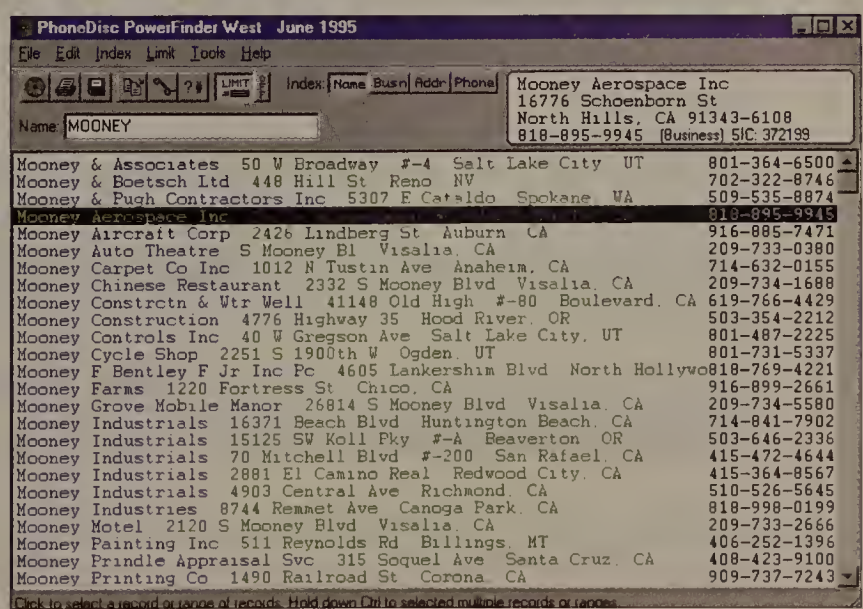
PhoneDisc PowerFinder

PROS: Dynamic search as you type, export to mailing labels and envelopes
CONS: Must print or export after each search

For $99, PhoneDisc PowerFinder provides access to 100 million residential and business names. While it was nice to see my name listed in this latest release of PhoneDisc, my phone number and address were about a year out of date. However, the powerful search-and-retrieval tools and a respectable accuracy rating of 84 percent more than compensated for this particular goof.

For starters, with PhoneDisc's tools you can search by name, street address, city, state, zip code, business heading, or phone number, and PhoneDisc displays the listings dynamically as you type (the other products don't start searching until you enter all the criteria). You can also sort the listings by address, name, business heading, or phone number. You could, for example, view every listed number for a given apartment building or industrial complex.

PhoneDisc also has robust exporting capabilities. You can export an unlimited number of listings in 18 file formats, from Act to Word Mail Merge. You can also select specific records to export, or export all records that meet the current search criteria. PhoneDisc gives you full control over the format. You can, for instance, choose uppercase or proper case and switch the order of first and last names. *Digital Directory Assistance, 800/284-8353* **Reader service no. 656**



PHONEDISC POWERFINDER DISPLAYS NAMES DYNAMICALLY as you type. You can correct typos as you make them or view similar names.

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Cache Internal	16KB	16KB	16KB	16KB
Cache External	256KB (optional)	256KB (optional)	256KB	256KB
Architecture	PCI	PCI	TriFlex/PCI	TriFlex/PCI
Video Memory/Max.	1MB/2MB	1MB/2MB	1MB/2MB	1MB/2MB
Compaq 150 Color Monitor	Yes	Yes	Yes	Yes
Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
Expansion Slots (Total)	3	3	4	5
Drive Bays (Total)	3	3	4	5
Ports: Serial/Parallel	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)
Security Features	Yes	Yes	Yes	Yes
Processor Upgradable	Yes	Yes	Yes	Yes
101-Key Keyboard, Mouse	Yes	Yes	Yes	Yes
Software Preinstalled (Choice of)	MS-Windows® 95 or MS-Windows 3.1	MS-Windows 95 or MS-Windows 3.1	MS-Windows 95 or MS-Windows 3.1	MS-Windows 95 or MS-Windows 3.1
Energy Star Compliant	Yes	Yes	Yes	Yes
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Circle 35 on reader service card

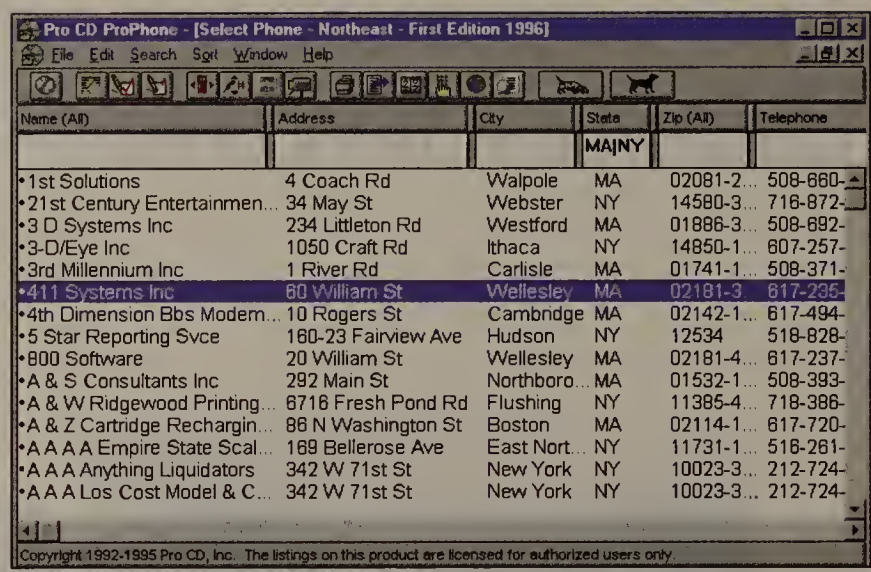
Select Phone

PROS: Powerful search capabilities, saves search results, proximity search tools, mapping utility

CONS: Jumbles order of names during exporting and printing

What a difference a year makes. In October 1994 when I first looked at Select Phone, our current Best Buy, I was very disappointed by the inaccuracy of its listings (it showed me at an address where I hadn't lived in four years). Now, it not only is the only directory that returned my correct phone number and address (it has an 89 percent accuracy rating), it also excelled in every other facet.

Select Phone's search capabilities are the best of the group. For starters, you can search by name, street address, city, state, zip code, phone number, and business heading. You can search residential or business listings or both. Similar to American Yellow Pages, Select Phone offers a predefined list of choices for the city, state, zip code, and business heading fields. Like PhoneDisc, Select Phone allows you to sort listings, which can make a difference when it's time for you to produce mass mailings. You can, for instance, export records by zip code, which makes you more popular with the post office and saves you money when you're mailing in bulk. Also, if you're not sure of the spelling of a person's name or where they live, you can use the proximity search command to expand your search to surrounding cities and alternate spellings.



CONDUCT SPECIALIZED SEARCHES IN SELECT PHONE simply by entering criteria in the appropriate field.

Similar to PhoneDisc, Select Phone offers powerful printing and exporting capabilities. But Select Phone beats all the rest by letting you save search results until you are ready to print or export them. (All the other programs require that you print or export the listings after every search.) Select Phone offers 20 export file filters to choose from, including Lotus Organizer, Access, and Excel, so you should have no trouble exporting data to your application of choice.

As with PhoneDisc, you can print matching or selected records, switch the positions of the first- and last-name fields, and print reports either in list form or to mailing labels or envelopes. On the downside, Select Phone has trouble with names that include apostrophes or internal capitalization. For instance, *McGrath* and *D'Amatao* appear as *Mcgrath* and *Damatao*, requiring manual corrections. In addition, names with suffixes such as *Jr* or *MD* get jumbled if you switch the order of the names; for instance, *Walker, Scott J Jr* would appear as *Scott J Jr Walker.*

An additional component you'll find in Select Phone is a mapping utility. MapView for Windows provides a map of the United States on which you can plot your listings. For example, if you want to expand your business to other areas, you can map out your current customers and identify areas of expansion. One nice feature: As you zoom in on areas of the map, it displays surrounding towns and neighborhoods. *Pro CD, 800/992-3766* **Reader service no. 657**

FEATURES COMPARISON Friendly Interface and Accurate Database Give SelectPhone the Edge

● = Yes ○ = No

Standard features	American White Pages	American Yellow Pages	PhoneDisc PowerFinder	Select Phone
Street price	$49	$49	$99	$99
Minimum disk space required	3MB	2.75MB	5MB	1.5MB (14MB with MapView)
Number of listings	70 million residential	10 million business	100 million business and residential	95 million business and residential
Searchable fields	name, city, state, zip, median home value, length of residence	company name, city, county, state, zip, business heading	name, street address, city, state, zip, phone, business heading	name, street address, city, state, zip, phone, business heading
Sort command	○	○	●	●
Exportable listings	5000 (additional listings cost extra)	5000 (additional listings cost extra)	all	all
Update cost	$49	$49	$79	$79
Update frequency	yearly	yearly	quarterly	quarterly
Service and support				
Free support / toll-free number	●/○	●/○	●/●	●/●
Weekday support (hours)	8	8	9.5	10.5 (8.5 hours on Friday)
Weekend support	○	○	○	○

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on PageMaker 6.0.

ock on a Sunday afternoon and you're finally crossing the last item off
kend's "to-do" list. Time to get physical, but the gym or a swim won't
get outside for a walk—not a stroll around the block, or a neon and
a power push. It's time for rugged walking.

lk tough

observant trend-watcher knows that outdoor activity is booming,
the boomingest activities is the pedestrian style. But what's only
ing noticed is that a majority of the millions of Americans now
active outdoor lifestyles aren't "doing" anything out there. They're
ss they're getting fit and enjoying the great outdoors.
e in the fitness boom and the outdoor recreation craze,
as slipped the notice of most media," says Robert Hoffman, a
rks on trail and river protection projects.
people don't want to climb Kilamanjaro or strap walking weights to
s, but they want to be outdoors after spending the better part of their
eek stuck in an office or other indoor setting," says Hoffman. "A
rugged walk in the outdoors [illegible] ntal and
[illegible] in a way that counting laps on a track or
steps on a treadmill just can't compare."
> What's more, rugged walking, by definition, removes the
[illegible] of competition that typifies most newer
forms of outdoor activity. For instance,
rock climbing and mountain bicycling,
two of the hottest recent
entries into the outdoor arena, are
about accomplishing bigger and
bigger challenges—a smoother rock face, a
ger ride. No knock against these adventurous sports, but for them it's
ment that drives the activity. For the rugged walker, the
one in the same. Challenging terrain is embraced and enjoyed,
no requirement.
tly, is rugged walking, and what's making it so popular? Two words

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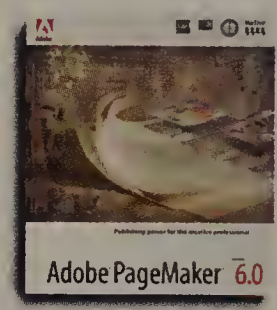

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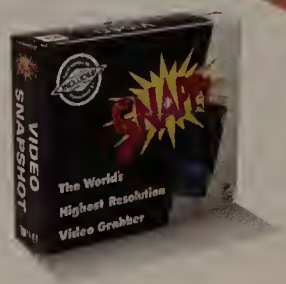

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Are you using the wrong e-mail service?

We tested AOL, CompuServe, MCI, the Microsoft Network, Prodigy, and the Internet to see which is fastest, cheapest, and easiest.

By Judy Heim

MARGARET RIEGEL

ONCE UPON A TIME, WHEN LIFE WAS A little slower, smoke signals and beating drums kept the primitive executive in touch with the home cave. Later on, mail delivery by horse, train, and truck did the trick. But in today's gotta-have-it-by-yesterday business world, the old ways just aren't good enough.

Which is why, when you're trying to stay in

touch with far-flung customers and co-workers, you probably rely on e-mail. When you're at the office, you probably depend on a network package like cc:Mail or Microsoft Mail. But what if you're working on the road or at home, or your LAN doesn't have a gateway to the outside world? To stay in touch, you'll need an online service—America Online (AOL), CompuServe, MCI Mail, the Microsoft Network, or Prodigy—or a local Internet access provider. Unfortunately, picking the right service is tricky. The question is, Which e-mail service gives you the best combination of speed, price, powerful software, and usability?

Faster Than a Speeding Message

Think of sending e-mail like mailing a package. First you have to get it to the point of delivery—stand in line at the post office, buy postage, and so on. Then it has to wend its way to your recipient, who, finally, has to wait in line to pick it up. When evaluating an e-mail service, you have to consider how long it takes for you to log in and upload your mail, for that mail to travel from your service to your recipient's, and for him or her to to pick it up. We think this entire process should take no more than an hour—after all, we're talking about electrons here.

Fortunately, in most cases, uploading and downloading mail doesn't take that long. When we tested each service for upload and download speed, most took a minute or so at each end (including log-in). Prodigy was the one exception: Getting mail to the point of delivery and picking it up took more than 2 minutes at each end.

Such log-in times are insignificant compared with actual delivery times. A message sent within a given service—say, from one AOL mailbox to another—usually arrives almost instantly. But send that same message to another service, and it can take longer—in some cases, a *lot* longer.

To find out just how long, we spent a week mailing messages to and from our various e-mail services and measuring the time it took each missive to arrive at its destination. To recreate typical business use, we mailed four times a day—at 9 a.m., 1 p.m. 5 p.m., and 8 p.m.

Most of these messages showed up in 10 minutes or less; all of them arrived sooner or later. But that's not to say we didn't have problems. Online services definitely have bad mail days, taking several hours to deliver messages. When you send a message from one service to another, it first goes through the sending service's internal mail system, then travels (usually via the Internet) to the receiving service. We were surprised to find that most delayed messages spent their lost hours inside the sending service's mail system. Once they were released at their destination mailboxes, they arrived in a matter of minutes.

Slowdowns on the big services didn't surprise us—we hear about them all the time from readers. What did surprise us was how well the Internet performed. Given the Net's unmanaged nature and rapid expansion, we expected plenty of delayed and missing messages. But in our testing, mail sent between two Net mailboxes consistently arrived in less than 3 minutes.

Cheaper Than a First-Class Stamp

The question of cost is really a question of time: Most online services give you a certain number of free hours for a base monthly fee, then charge by the hour. The issue is how many hours a month it will take to deal with your mail.

To find out, we created the ideal case: Taking the upload and download times we used to measure performance, we figured out how much time it would take under perfect circumstances to send and receive a total of 10, 50, 100, and 200 messages a day. We then calculated how much these various levels of usage would cost on each service. We were surprised to find that if you're absolutely efficient (composing mail offline and using automatic log-in utilities), you could theoretically send and receive 100 messages a day on most services without incurring any of those extra hourly fees—even on the Microsoft Network, which gives you only 3 free hours.

But monthly fees are only part of the cost equation. You also have to consider phone

The Price of E-Mail

We calculated how much time it would take to send 10, 50, 100, and 200 messages per day, then how much that online time would cost you each month. The result: If you're unfailingly efficient, you can send 100 messages a day for less than $5 a month.

	Cost to send/receive 10 messages per day	Cost to send/receive 50 messages per day	Cost to send/receive 100 messages per day	Cost to send/receive 200 messages per day
America Online [1]	$9.95	$9.95	$9.95	$16.71
CompuServe [1]	$9.95	$9.95	$9.95	$10.64
Internet [2]	$4.95–$30	$4.95–$30	$4.95–$30	$4.95–$30
MCI Mail [3]	$11.20	$14.20	$17.95	$22.50
The Microsoft Network [4]	$4.95	$4.95	$4.95	$8.99
Prodigy [1]	$9.95	$9.95	$11.32	$25.48

[1] $9.95-per-month base rate includes 5 free hours, $2.95 per hour thereafter

[2] Monthly fees and terms of service vary by vendor, but prices generally range from $20 to $30 for unlimited access; CompuServe's Spryte service costs $4.95 per month for 3 free hours, $1.95 per hour thereafter.

[3] $10-per-month base rate Includes unlimited incoming messages and 40 outgoing messages; thereafter, 50 cents for the next 100 to 500 characters, 10 cents for characters 501 to 1000, 10 cents for characters 1001 to 10,000, and 5 cents for each additional 10,000 characters after that.

[4] $4.95-per-month base rate includes 3 free hours, $2.50 per hour thereafter.

METHODOLOGY We measured how long on average it took to log in to each service and transmit a series of 1000-character messages. In each case, we used a 14.4-kbps connection and the most efficient mailing method (most services offer utilities that let you compose mail offline and then automatically log in and upload your mail). Using these figures, we calculated how much it would cost for four levels of e-mail usage (10, 50, 100, and 200 messages a day) billed at each service's base rate. Be warned: These are best-case scenarios, and your mileage will no doubt vary.

bills. If you must dial long-distance or use a special, surcharged network (such as WATS or SprintNet), your phone bills could easily exceed the service's fees. Ideally, your e-mail service should be either toll-free or a local call away; if it's toll-free, you shouldn't have to pay your service provider extra.

Easier Than Licking an Envelope

The third factor we looked at was usability. For some users, e-mail software should be powerful: It should let them store copies of outgoing mail, attach files, schedule unattended log-ins, review messages before downloading them, sort incoming and outgoing mail in custom folders, and search their mail. For others, ease is the key. They may not care about customized folders or automated log-ins, but they do want an intuitive interface. The processes of invoking the mail utility and composing, addressing, sending, and receiving e-mail should all be completely obvious.

So where did all this mailing, pricing, and software evaluation lead us? For speed and reliability, the Internet itself performs best, followed closely by MCI Mail and the Microsoft Network. Microsoft Network and CompuServe's new Internet-only service, Spryte, cost an unbeatable $4.95 per month each. For software, the many Internet e-mail packages and CompuServe's interfaces are the most powerful, while America Online is tops for ease of use.

All of which leads us to one overall conclusion: As long as you're not afraid of some gnarly software, a low-cost SLIP/PPP Internet link is your best all-around e-mail deal. MCI Mail is second best, particularly if you're on the road a lot. For the gory details on these and your other e-mail options, take a look at the service-by-service evaluations that follow.

Judy Heim is a contributing editor for PC World *and author of* I Lost My Baby, My Pickup and My Guitar on the Information Highway *(No Starch Press, 1995, 800/420-7240). See page 14 for contact information. Thanks to slip.net of San Francisco for Internet services.*

For more information about all products in this article, circle reader service no. 911.

How Fast Is Fast Enough?

Messages shouldn't take more than an hour to get where they're going; ideally, they should arrive in 10 minutes or less. Which e-mail service really delivers?

Sending

	Time to mail: average	Time to arrive: average	Time to arrive: worst	Percent delivered in under 10 min.	Percent delivered in over 1 hour
America Online	0:01:15	0:15:00	3:20:00	93	7
CompuServe	0:00:58	0:42:00	7:18:00	67	33
Internet SLIP/PPP	0:00:48	0:01:00	0:52:00	100	0
MCI Mail	0:00:53	0:02:00	0:06:00	100	0
The Microsoft Network	0:01:00	0:11:00	0:11:00	100	0
Prodigy	0:02:17	0:35:00	3:54:00	68	4

Receiving

	Time to pick up: average	Time to arrive: average	Time to arrive: worst	Percent delivered in under 10 min.	Percent delivered in over 1 hour
America Online	0:01:23	0:35:00	7:52:00	89	11
CompuServe	0:01:03	0:01:00	0:02:00	100	0
Internet SLIP/PPP	0:00:56	0:01:00	0:11:00	100	0
MCI Mail	0:01:01	0:01:00	0:11:00	96	0
The Microsoft Network	0:00:55	0:03:00	1:16:00	96	4
Prodigy	0:02:34	0:01:00	0:03:00	100	0

Time in hours:minutes:seconds.

METHODOLOGY To measure the time it takes to deliver and pick up mail, we created ten 1000-character messages, then timed the processes of uploading and downloading them (at 14.4 kbps). To measure how long those messages spend in transit, we spent a week mailing messages to and from each online service. We calculated the time it took each message to arrive, the average and worst times for a week's worth of mailing (we didn't calculate best times—every service delivered at least some messages in less than a minute), and the number of messages that took less than 10 minutes or more than an hour to arrive.

America Online

America Online's simplicity and low cost make it a viable option for the occasional e-mailer. But its performance and lack of powerful features make it less than ideal for business use.

There's no argument that AOL is one of the easiest services to set up and use. FlashSessions let you compose mail offline, then upload it at prescheduled times. You can create custom folders to store mail, search mail (by subject, sender, and text), and attach files using MIME (Multipurpose Internet Mail Extensions) encoding. But with ease of use come some limitations: You can't review subject lines before downloading, the service doesn't automatically save copies of messages you've sent, and messages disappear from the system after three weeks (even if you haven't read them).

AOL's price—$9.95 a month, including 5 free hours ($2.95 an hour thereafter)—is competitive with that of other e-mail options, but its performance does not measure up. While most of the messages we sent and received from AOL took less than 10 minutes to arrive at their destination, they occasionally took hours (such performance delays jibe with what we hear from AOL users). And while AOL offers an abundance of fast access lines (more than 300 14.4-kbps lines nationwide, slated for upgrades to 28.8 kbps in the coming months), we still found logging on and off took longer than with all other services except Prodigy.

All in all, unless ease of use is what you crave most, we'd say you should bypass AOL in favor of one of the more powerful, more reliable options.

America Online, 800/827-6364

Reader service no. 775

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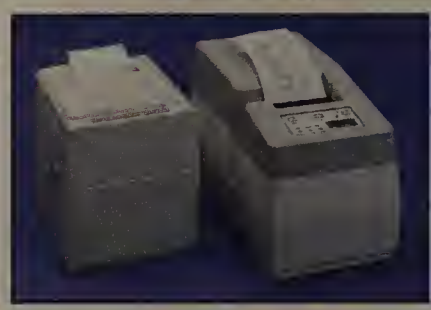

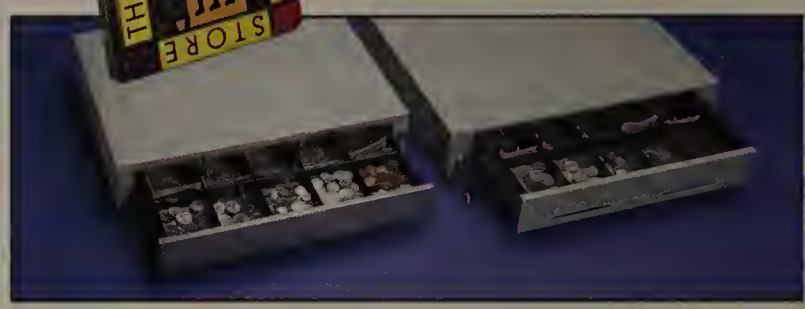

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PW-296

Circle 212 on reader service card

From Any Service, to Any Service

You can send e-mail between any of the major online services as long as you know how to address messages correctly.

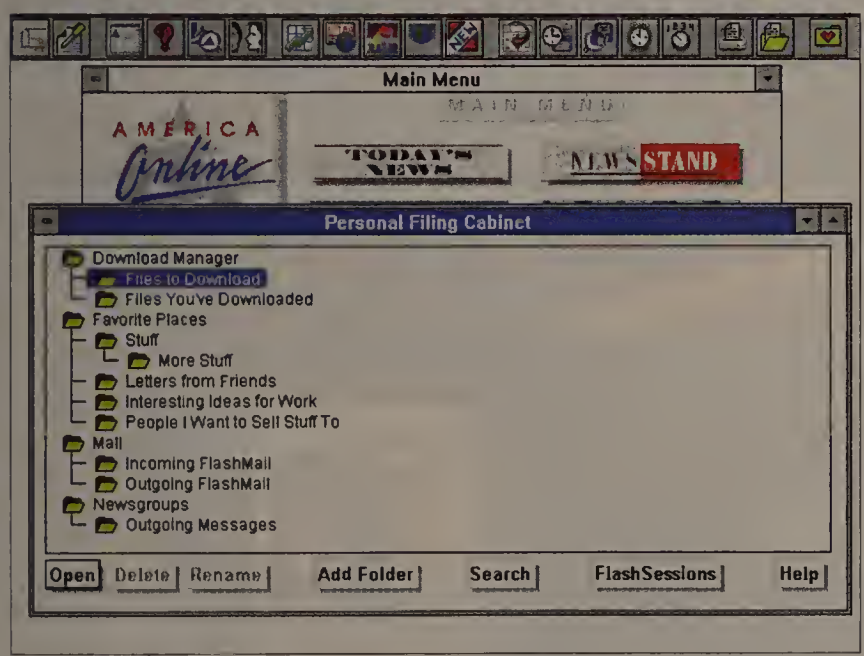
	Sending from...	Sending to...
America Online	In the To: field, type the recipient's Internet mail address. Example: **Mary_Smith@internet.com**	Add **@aol.com** to the user ID. Example: **MarySmith@aol.com**
CompuServe	In the Address field of WinCIM's Create Mail/Recipient List dialog box, type **Internet:** followed by the recipient's Internet address. Example: **Internet:MarySmith@aol.com**	Add **@compuserve.com** to the numeric user ID and change the comma to a period. Example: **75300.713@compuserve.com**
MCI Mail	At the To: prompt, type the recipient's name followed by **(ems)**. At the EMS: prompt, type **Internet**. At the MBX: prompt, type the recipient's full Internet address. Example: **Mary Smith (ems), internet, Mary_Smith@Internet.com**	Add **@mcimail.com** to the numeric user ID, and delete the comma. Example: **3127737@mcimail.com**
The Microsoft Network	In the To: field, type the recipient's Internet mail address. Example: **Mary_Smith@internet.com**	Add **@msn.com** to the user ID. Example: **MarySmith@msn.com**
Prodigy	In the To: field, type the recipient's Internet mail address. Example: **Mary_Smith@internet.com**	Add **@prodigy.com** to the user ID. Example: **slsvda@prodigy.com**

CompuServe

CompuServe has long been a favorite of business e-mailers, thanks in large part to its reputation for speed and reliability and the high quality of its navigation programs. With recent price cuts bringing it in line with AOL and others, you'd think it would be an ideal e-mail service.

Unfortunately, CompuServe's reputation for reliability may be subject to question: One-third of our outgoing messages took more than 10 minutes to arrive at their destination, and several took hours. It's important to note that these slow transmissions occurred only on two particular days, which leads us to believe this problem may have been a transient glitch—all messages sent on other days arrived in a timely fashion. Still, CompuServe itself admits that mail sent out over the Net will take "30 minutes to 48 hours" to arrive.

There's no question that CompuServe's reputation for high rates and surcharges is no longer deserved. To be more in line with AOL, the service recently cut its prices: The base rate is now $9.95 a month for 5 hours, $2.95 per hour thereafter; a Super Value Plan is available for $24.95 a month for 20 hours, and $1.95 per hour thereafter. There are still some hidden fees. In cities that do not have access to the CompuServe Network, users have to dial in via surcharged access lines.



AMERICA ONLINE'S PERSONAL FILING CABINET lets you save your mail in easy-to-create custom folders.

In contrast to AOL, CompuServe lets you use a number of software interfaces. CompuServe Information Manager for Windows, which comes free with your membership, is okay to start off with. It lets you write mail offline and store messages for eternity. But it won't let you search them, and scrolling through a big list every time you're looking for a particular message gets old fast. Other Windows packages, such as Navigator (downloadable from CompuServe for $9.95) and Rosebud ($34.95 from Magee Enterprises), remedy these deficiencies; DOS users can try one of many excellent shareware navigators, such as AutoSIG, OzCIS, and TapCIS (all of them downloadable from CompuServe). These packages make logging on and transmitting mail incredibly fast: In our trials, we were consistently able to upload or download ten messages in less than a minute.

Still, given the perfect or near-perfect performance we found on other online services, CompuServe's delivery glitches are enough to warrant avoiding the service if fast, reliable delivery is crucial. If it isn't, and if you want powerful e-mail tools, CompuServe's excellent software and competitive pricing make it a fine choice.

CompuServe Information Service, 800/524-3388 ext. 664

Reader service no. 776

Internet

For heavy-duty e-mail users, a direct SLIP/PPP Internet account can't be beat. While monthly fees often hover around $20 to $30, CompuServe recently announced a nationwide Internet-only service called Spryte that costs just $4.95 a month for 3 hours. For the money you get incredible performance and the opportunity to use some great e-mail tools.

When we say incredible performance, we mean nearly instantaneous transmission of messages. In our initial time trials, no mes-

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Cutting E-Mail Costs

Readers frequently write us about how they unwittingly racked up online bills of $100-plus. Here are some tips to get the most out of your e-mail bucks when you sign up with a service:

Know what you get for your monthly subscription fee. **How many hours of access do you get, and once you use them up, how much will you pay per hour? How much mail can you send without incurring extra charges?**

Search out hidden fees. **Will you be charged for faxes? What about special message handling—will you be charged extra for multiple addresses or requesting receipts?**

Make sure the service has a local or toll-free number. **Several services have more than one access number in a given area, some free, others bearing ghastly surcharges. Be sure to find out which carrier network your access number uses (SprintNet, for example), and check to see if it's surcharged.**

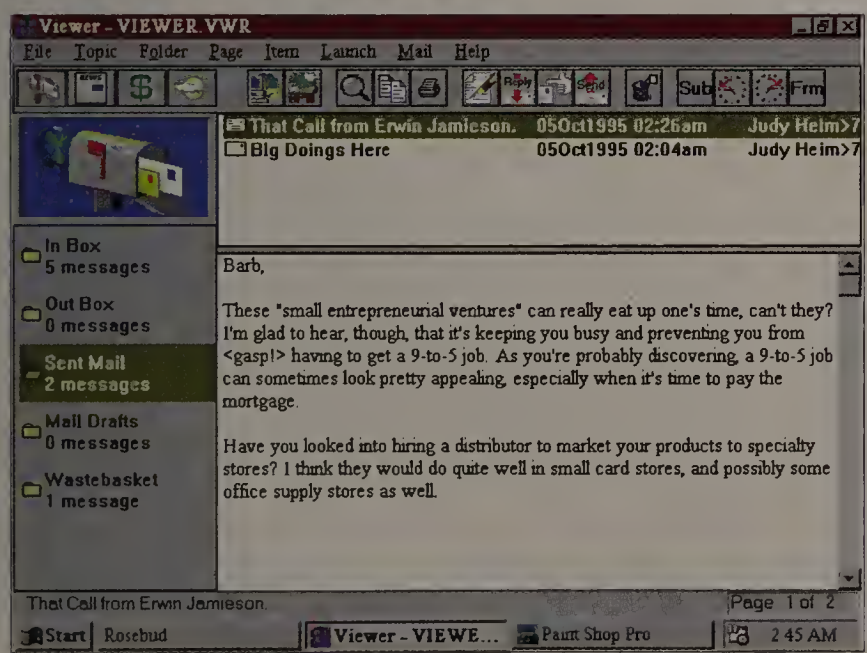
Call at night. **Phone rates drop after hours, and in some cases (as with some Internet accounts), so do rates for the e-mail services themselves.**

Automate mail retrieval. **Use whatever software your service offers to automate the processes of logging in and sending and retrieving mail.**

Be a smart consumer. **If you have any doubts about your bill, ask for an itemized printout detailing how much time you spent online and how many messages you sent—and what you were charged for both the time and the messages.**

sage sent between two direct Internet connections took longer than a minute to arrive. In fact, the results were so stunning, we expanded our testing, sending hundreds of messages between Internet mailboxes all over the country. Even at that volume, just one message took longer than an hour (and it had a 144MB file attached to it); virtually all the others arrived in less than 10 minutes. And with no pretty interface to load, log-in times were fast, too.

The only problem with using the Net for mail is getting connected. First, you have to find an Internet access provider. There's no shortage of local and national providers. And while we hear horror stories about fly-by-night operators taking user money and running, we also know that reliable providers abound in most area codes. Also, there's an increasing number of national providers, who offer local dial-in numbers in major cities and/or nationwide toll-free numbers.



WITH COMPUSERVE FRONT ENDS LIKE ROSEBUD, you can write mail offline, then automate sending and retrieval.

After you've got the account, you've got to get the software—communications utilities for connecting to the Net, and an e-mail package for composing and sending mail. Several of the latter are on the market; the leading Windows programs are Eudora Pro, Pegasus, and Pronto Mail. All three can beat the pants off any online service's mail tools.

Sure, getting all this to work can require an onerous amount of technodoodling. But we say take the plunge: As far as we can tell, for fast, cheap e-mail, the Internet can't be beat.

Eudora Pro, 800/238-3672
Reader service no. 777

Pegasus, **orders@pmail.gen.nz**
Reader service no. 778

Pronto Mail, 415/578-6580
Reader service no. 779

Spryte, 800/557-9614 ext. 26
Reader service no. 780

MCI Mail

While MCI Mail doesn't offer the frills of other online services, its e-mail–only focus and nationwide access have long made it a favorite of business users. And its price is still right. For a monthly fee of just $10, you can send 40 messages per month of up to 5000 characters each; after that you pay by the character, and there's no limit on the number of messages you receive. Your phone bills will stay low, too: The service imposes no surcharge for use of its nationwide 800 number. Even volume e-mailers would have a hard time spending more than $20 a month. And MCI Mail gets the job done: Only 1 of the 50-odd messages sent to and from MCI took longer than 10 minutes to get where it was headed.

Unfortunately, MCI Mail has one big drawback: no software. Sure, there are a bunch of shareware macros and utilities floating around for accessing MCI. But most MCI subscribers still use a general communications program in terminal mode (yuck). This setup can lead to some antiquated machinations: To send a file attachment, you must tell MCI what file transfer protocol to use, then tell your own software. Since MCI Mail's highest connect speed is currently 9600 bps, the going can be slow.

But if you're willing to put up with the horse-and-buggy interface, MCI Mail is a great e-mail tool. And its toll-free access makes it the best for e-mail on the road.

MCI Mail, 800/955-6505
Reader service no. 781

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LOGITECH

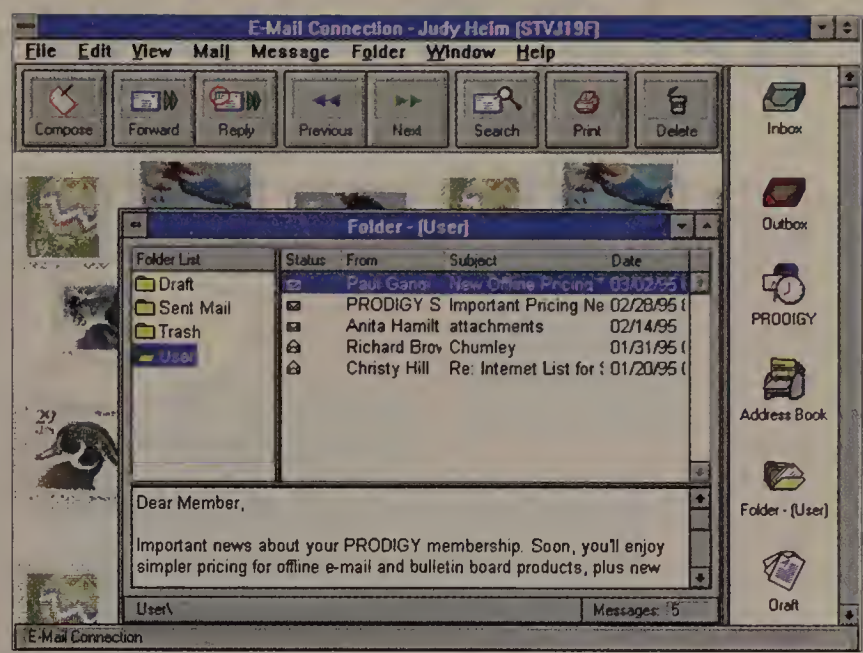
Products people love

The Microsoft Network

The Microsoft Network, included with Windows 95, is the newest player in the e-mail game, and it's having an impressive rookie season: It delivers the mail reliably, and the price is right. The only drawback: Its interface is awful.

Under one MSN plan, you pay just $4.95 a month, which gets you 3 free hours (they're $2.50 each after that). An alternative plan costs $19.95 a month, with 20 free hours ($2 each thereafter). Under absolutely ideal conditions, even volume e-mailers should be able to squeak by under the 3-hour wire, assuming they use all the tricks at their disposal. Microsoft has been aggressive about rolling out high-speed access around the country, offering an impressive number of 14.4- and 28.8-kbps access nodes in major cities. The company has been remiss, however, in wiring the boondocks, relegating callers in outlying areas and small towns to speeds as low as 2400 bps. No matter what the speed of your connection, though, your mail should get through: Only one of the umpteen messages we sent failed to arrive in our prescribed 10 minutes.

Unfortunately, getting messages to the delivery point can be a real pain: To send and receive mail on MSN, you use Exchange, a universal mailbox built into Windows 95 and one of the least friendly front ends we've seen. The icons are bewildering, and it's not intuitive. And once you've logged on to MSN, the network will bog you down, throwing a slow-to-etch welcome screen at you when all you want to do is retrieve your mail. One wrong click on any screen element can result in unwanted MSN screens' painting themselves furiously again and again while you try to click them away. And after all that, you may get nothing but error messages reporting that the service is unavailable and that you should try accessing it later.



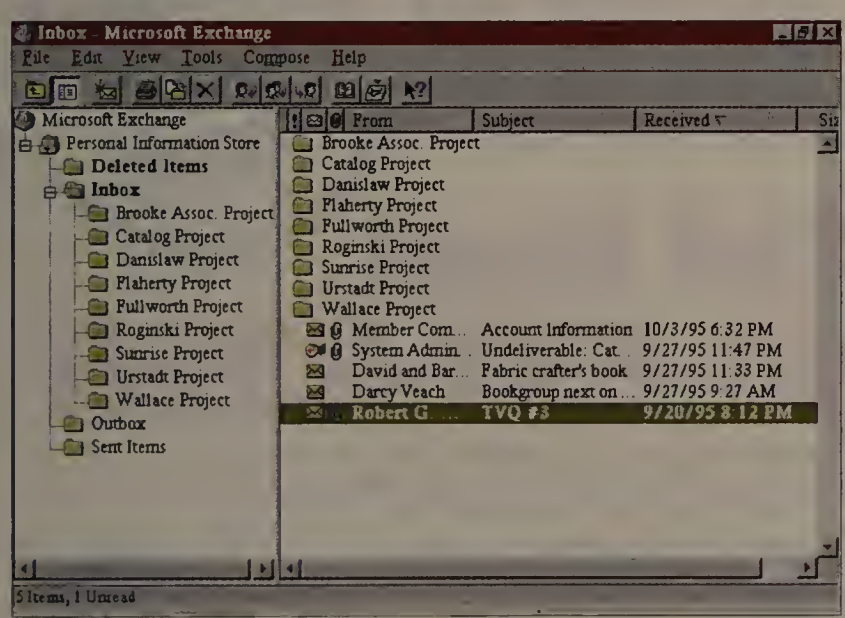
E-MAIL CONNECTION AUTOMATES PRODIGY mail retrieval and allows you to write mail offline and sort it into folders.

Despite its troubled interface, Exchange offers some pretty nice mail-management features—like the ability to create folders and store messages in the folders by dragging and dropping them. It lets you write mail offline, log on to send it, and log off to read your new mail. If you're a Word user, you can compose messages in Word and direct Exchange to send them later. You can adorn messages with fancy fonts, color, formatting, and graphics and even embed files with simple dragging and dropping. The one hitch: Only fellow Exchangers will be able to see your special effects. For the rest of your e-mail recipients, Exchange will automatically encode binary file attachments (using the common uuencode format).

But these features are not enough to redeem Exchange. While MSN's price and performance are great, its interface is bad enough to keep us from recommending the service.

The Microsoft Network, 800/386-5550

Reader service no. 782



EXCHANGE MAY LET YOU DRAG AND DROP your Microsoft Network mail between folders, but it's still clumsy.

Prodigy

Like AOL, Prodigy was never intended to be used as a serious business mail service. Unfortunately for business e-mailers, the service has lived up to its intentions: Its performance is unreliable, its pricing is uncompetitive, and its software tools leave much to be desired.

With the same rates as AOL and CompuServe (the basic plan with 5 free hours costs $9.95 per month; after that the tariff is $2.95 per hour), Prodigy would seem to cost the same as those other two. But it doesn't, thanks to sluggish online performance. From the time you log on until you arrive at the e-mail center, slow-to-display advertisements keep popping up everywhere. It took us almost three times longer to log in to Prodigy than to CompuServe.

Once you've waded through the log-on sequence and arrived at the recently revamped mail module, you'll find it offers only rudimentary tools (it won't let you send file attachments to outside addresses, for example). If you want more, you can download the $14.95 E-mail Connection utility from Prodigy. This program lets you create folders for storing incoming and outgoing mail, search stored mail and schedule mail runs. But even this solution has its drawbacks—the program is awkward and claustrophobic, its crowded screens crammed with icons.

No matter which interface you choose, mail sent from Prodigy can take a long time to get where it's going: One test message took nearly 4 hours to arrive at its destination. Given the slow connections and so-so software, we'd say skip Prodigy in favor of something more efficient.

Prodigy Services, 800/776-3449

Reader service no. 783

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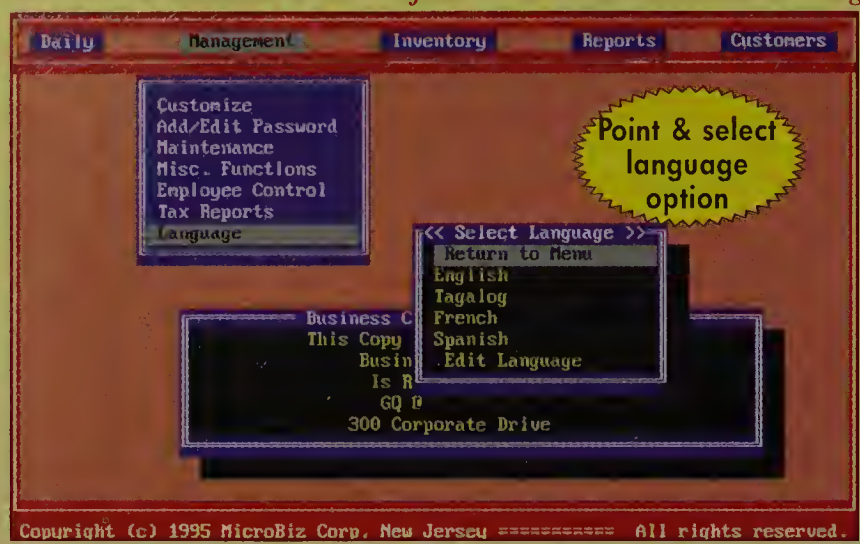

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  Always know what/how many items are in stock and cut losses by reducing shrinkage.
- **Mailing Lists**
  Create mailing lists from customer information you collect with the software to generate more sales!
- **Invoicing**
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- **Employee Commission**
  Measure employee productivity (with this report you will know who is working and who is not).
- **Receipt Generation**
  Receipts show details of the sale increasing customer trust.
- **Customer Tracking**
  Know everything from customer names and birthdays to frequency of merchandise purchased. Find new ways to keep customers coming back.
- **Pull Down Menus & Pop Up Windows**
  Simple, quick and easy checkouts keep customers happy and loyal.
- **Open Data**
  We use *x*base type files so you can import data into spreadsheets and word processing programs.
- **Backorder Tracking**
  Track backorders for all of your customers. Now you don't have to remember, your software will remember for you.
- **Multi-site Version**
  Do you have more than 1 location? Multi-site will transfer and share all information from each location, saving you hours of time each day.
- **International Version**
  More than 1 language? Multi-language capability allows you to convert this to any language!
- **Leader in POS Industry:**
  - 100,000 installations worldwide
  - Inc. 500 list (1993, 1994, 1995)
  - Rated **"Easiest to use"** by Computer Reseller News, 11/7/94

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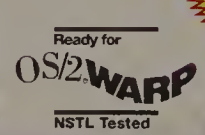

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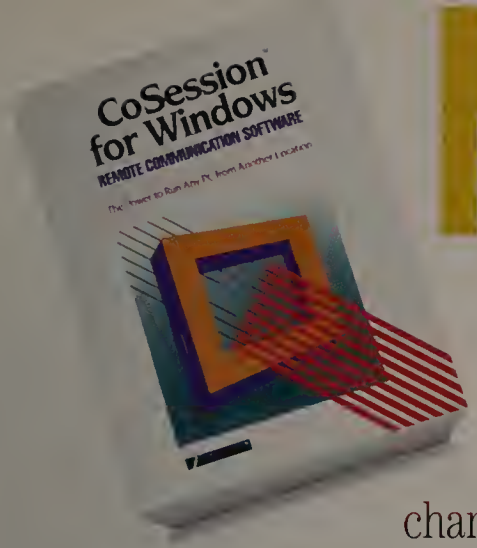

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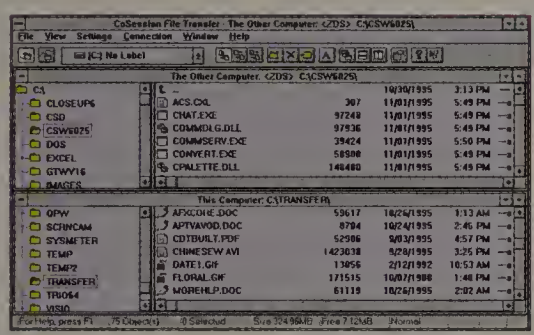
REMOTELY EVEN



User-friendly file transfer menu performs fast file transfers with drop and drag ease.

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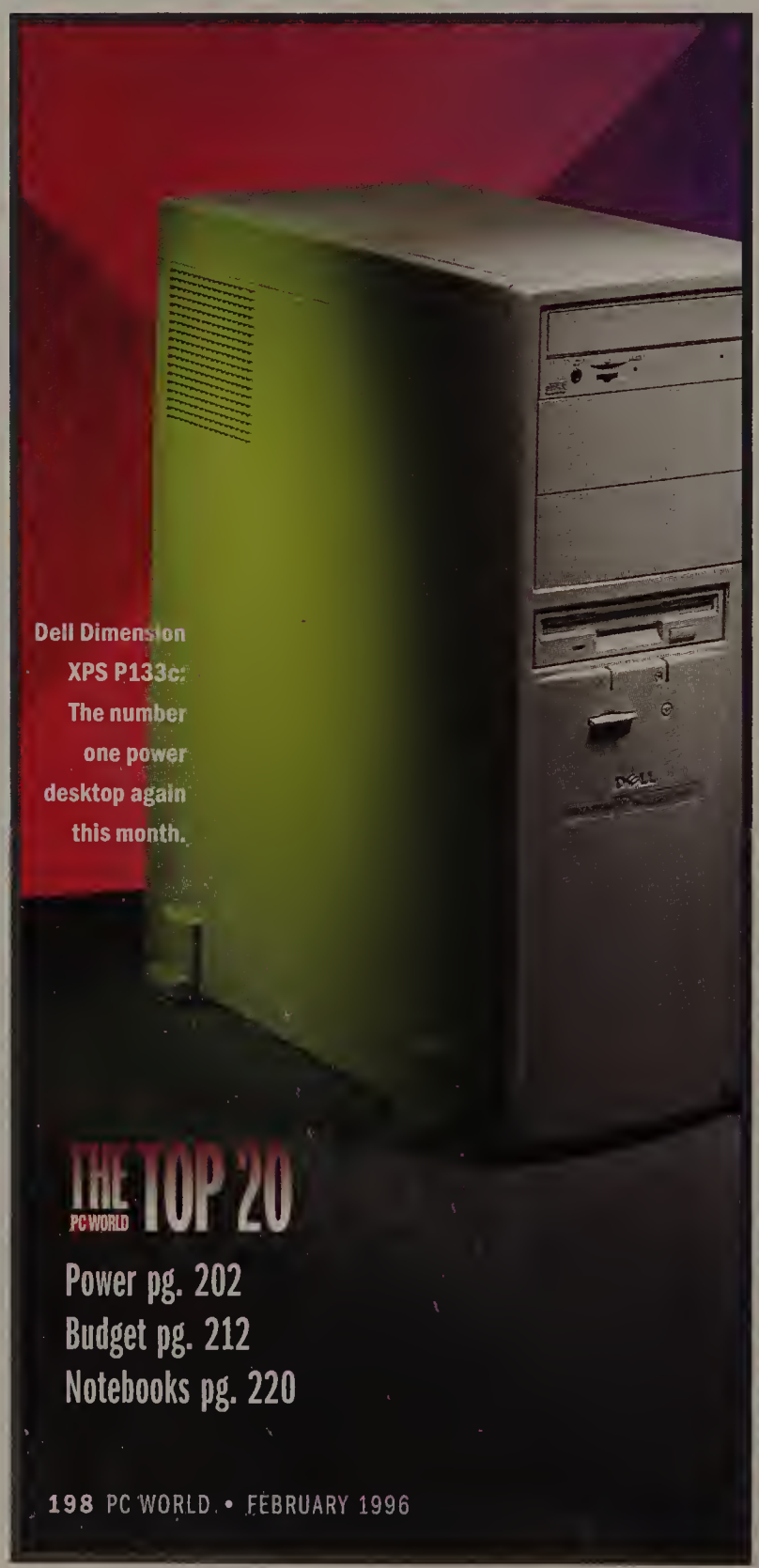
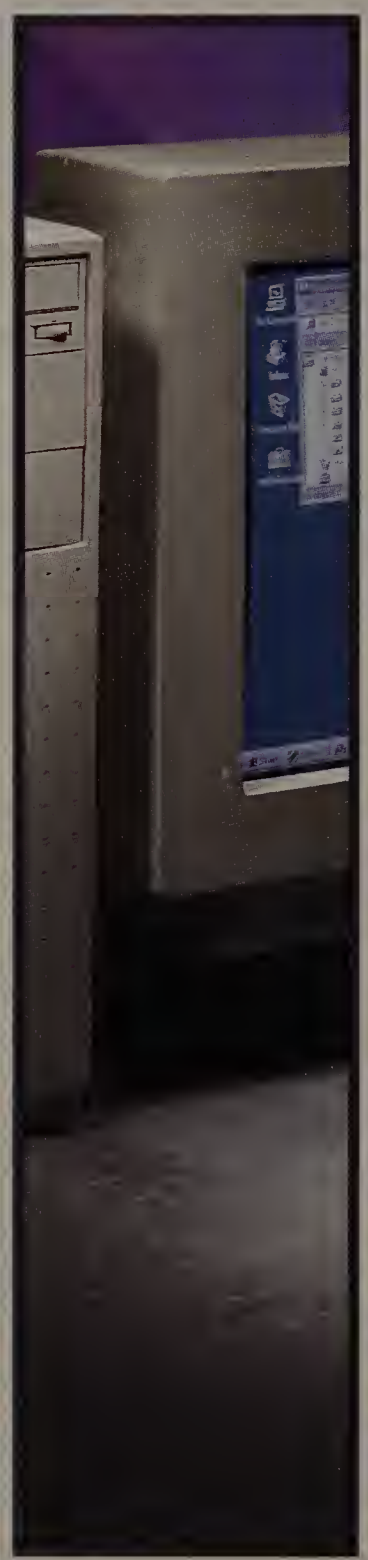
SONY

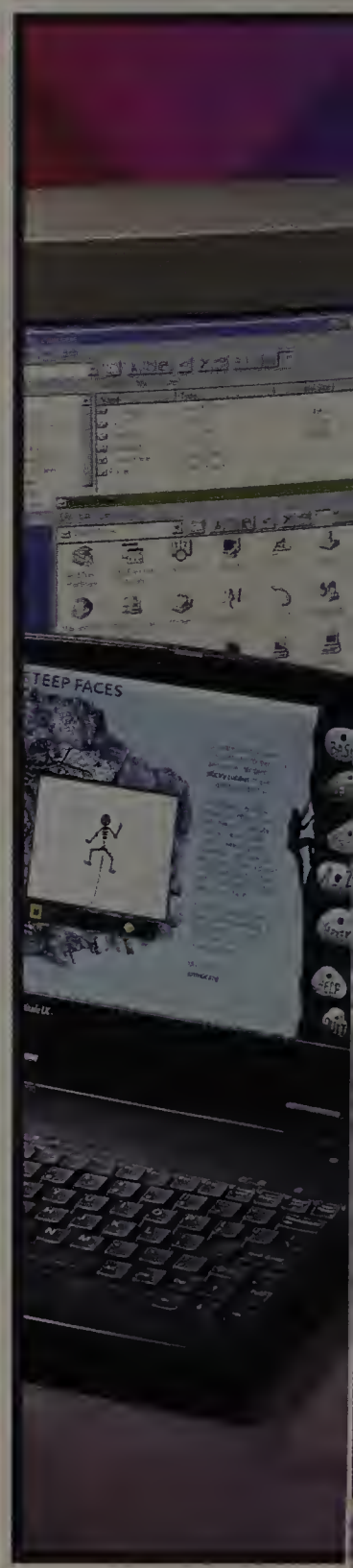
Top 20 PCs Pentium

New Pentium-150s and -166s burst into the Top 20 Power ranks,
but Pentium-120s and -133s defend their Best Buys for now.



Dell Dimension XPS P133c: The number one power desktop again this month.





THE TOP 20
PC WORLD

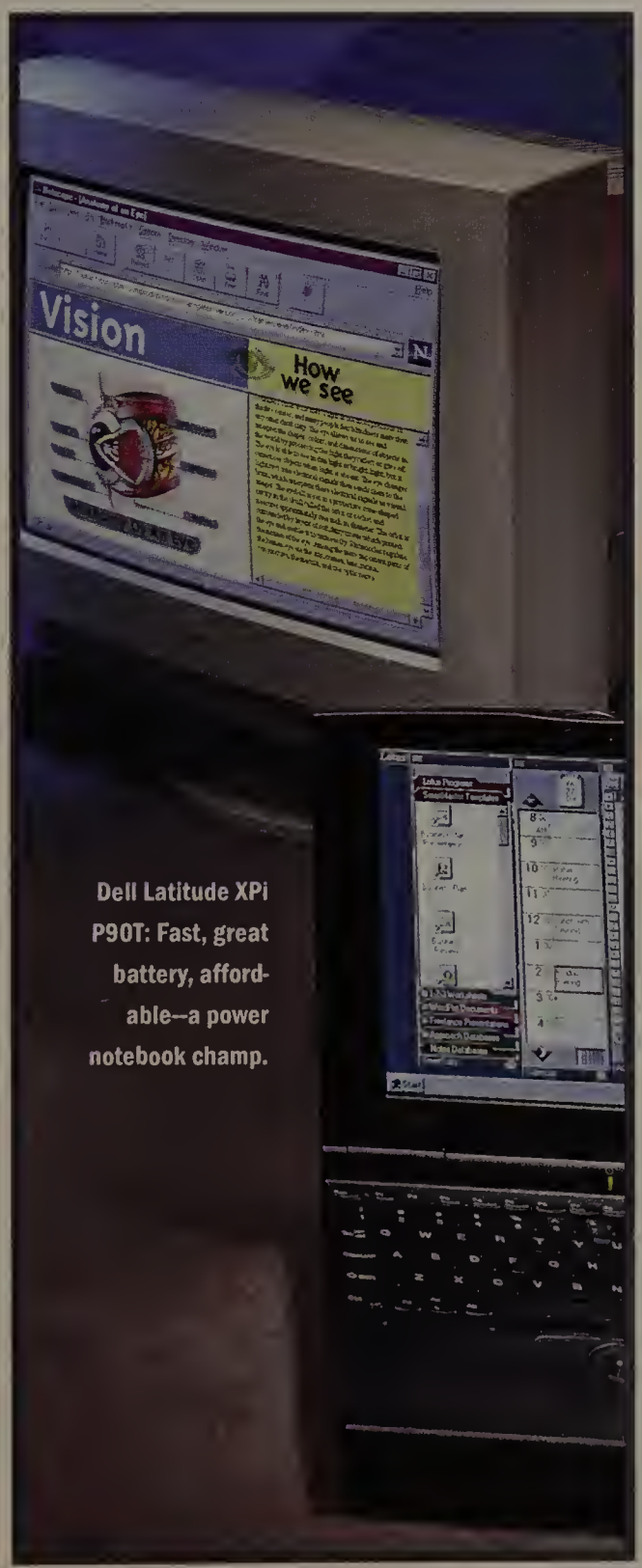
Power pg. 202
Budget pg. 212
Notebooks pg. 220

Power Play

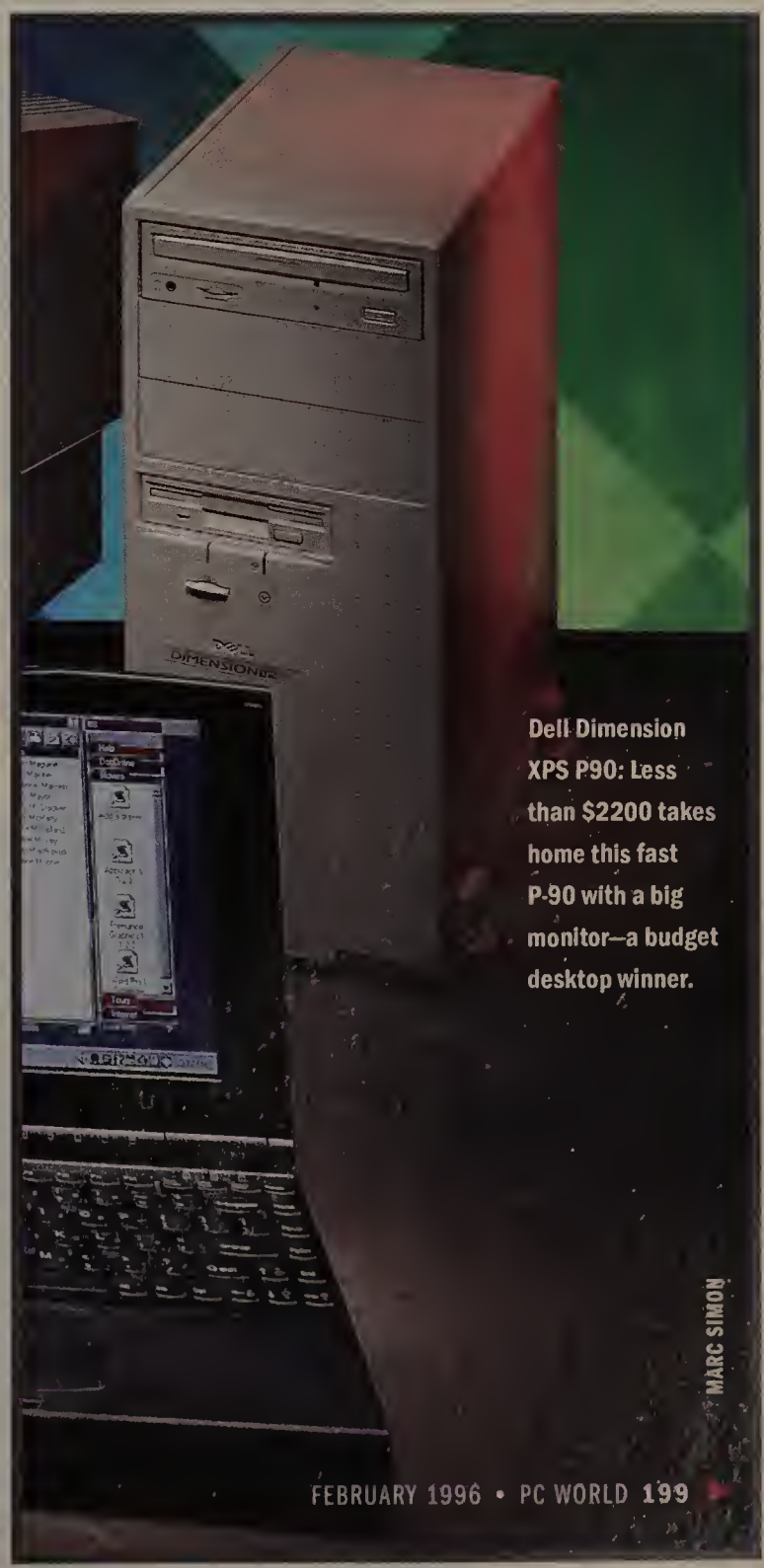
By Rex Farrance
and Melissa Riofrio

YOU EXPECT NEWER, HIGHER-PERFORMANCE CENTRAL PROCESSING UNITS TO RESULT in faster personal computers, and historically they always have. Well, here we go again—this time with two hot new Intel processors to evaluate. For this month's Top 20, we review two Pentium-150 systems, along with two of the first P-166 machines off the line. As anticipated, these are all very fast PCs. What surprises us, however, is

Dell Latitude LX 4100D: Quick and priced under $2000, it's our new top budget notebook.



Dell Latitude XPi P90T: Fast, great battery, affordable—a power notebook champ.



Dell Dimension XPS P90: Less than $2200 takes home this fast P-90 with a big monitor—a budget desktop winner.

MARC SIMON

that not one of these initial offerings is compellingly faster than the quickest of the P-133s already on our Power Desktops Top 20.

Of course, the first PCs in a new CPU class usually don't perform as well as later units. Anything from updated graphics drivers to a better-tuned chip set can improve performance on a system with a brand-new processor. It should also be noted that we had no systems we could directly compare with previous units—PCs configured identically except for the CPUs. The Micron P166 Millennia Plus came closest; however, it had a SCSI storage setup, making it faster at multitasking but slower than an IDE system on our benchmarks. So it's not directly comparable to the P133 Millennia already ranking high on our Power Top 20.

Pentium-150s and -166s: Ready for Prime Time?

So should you buy a new Pentium-150 or P-166 now or wait? Based on price, performance, features, service, and reliability, the four new systems tested are good enough values to make our Power Desktop Top 20—though none is a Best Buy. On the other hand, if you buy a P-150 or -166 right now, it may not have performance as sterling as you'll find in a month or so. And to make life more complicated, there will be a smorgasbord of new CPUs in the PCs we will review—Pentium Pro contenders up to 200 MHz and systems using Cyrix's new heavy hitter, the 6x86. As always, this high-performance competition will make prices on mainstream systems—such as our current Best Buys—ever more reasonable.

For more on the Pentium-150 and -166 processors, see *Top of the News* and "Choosing Your Dream PC" in this issue.

Prices Plunge—Performance and Features Soar

Top 20 P-133 systems average $100 less this month, and a $306 price drop moved Dell's Dimension XPS P90 to the top of the Budget Desktops chart. Meanwhile, the last P-90s have left the Power Desktops Top 20, and only two power P-100s remain. A quarter of our Top 20 Budget Desktops have Pentium-100 or faster CPUs, including one P-120: the Gateway 2000 P5-120.

Micron P166 Millennia Plus features Iomega's hot new Jaz drive, a fast SCSI drive with 1GB removable media. Extra cartridges sell for only about $99 each.

JOHN GREENLEIGH

Buying Smart: Consumer Tips

Bus mastering speeds up multitasking.
To take full advantage of Windows 95's multitasking capabilities, consider ordering your new PC with an adapter for a SCSI hard drive and bus mastering. With most standard desktop IDE and SCSI adapters, reads and writes must be completely controlled by the system CPU. SCSI bus-mastering adapters can queue and complete multiple reads and writes, freeing your CPU, for example, to run your spreadsheet program while you're downloading a file from the Web.

Windows 95 runs faster with more memory.
Windows 95 will run with 8MB of RAM, but your new PC should perform significantly better with 16MB. You may even want to add more memory in the future. To pave the most economical upgrade path, make sure you can upgrade RAM to at least 32MB without having to discard installed RAM modules (SIMMs).

Your credit card can be a safety net.
Unless you already have a credit arrangement with the vendor, use a credit card to order all equipment. The credit card company can help mediate any disputes that arise or give you a refund if you fail to receive a product you've paid for.

Price slashing isn't confined to the desktop. Our top power and budget notebooks—both from Dell—have dropped $900 and $600 since last month, and notebooks on our power chart are, on average, $300 less expensive. The budget notebooks continue to get faster, better, and cheaper, with many systems matching the performance of power notebooks just six months ago and prices falling an average of $100 with no loss in features. For example, almost a third of our budget notes now feature active-matrix color screens.

Windows 95 Tests Coming

In our next issue—March—we will switch to Windows 95–based benchmarking. Although we recognize that many of our readers—particularly those in large corporations—will stick with Windows 3.1 for some time, firsthand experience has shown us that Windows 95 is better; we have fewer crashes, especially with the huge spreadsheets we use to rate PCs. The upgrades to most popular business apps will be designed for Windows 95, and we're seeing many PCs shipping with Windows 95 only. So after marathon development, testing, and debugging by our Test Center, our PC WorldBench is ready to go—and starting next month, we'll be using it to test all our Top 20 desktop and notebook systems.

Rex Farrance is a senior associate editor and Melissa Riofrio is an associate editor for PC World. *They can be reached on PC World Online (see page 14 for contact information).* PC World *staff members John Goddard, Eric Hellweg, and Arden Hoffman and freelance writers Geoffrey Coffey and Jon L. Jacobi contributed to this article. Testing by Dave Casini, Ulrike Diehlmann, Jeff Kuta, and Mike Salayko; research and support by Andrew Hawn and Julian Weatherby.*

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THE TOP 20

PC WORLD POWER DESKTOPS

1 **Dell Dimension XPS P133c**
Powerful without compromise.

	Last month	Months on chart	First reviewed	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1 Dell Dimension XPS P133c	2	4	Nov 95	87	115	73/69	$3366	Pentium-133	16	1624
2 Micron P133 Millennia	1	7	Aug 95	87	119	75/68	$3489	Pentium-133	16	1624
3 Dell Dimension XPS P120c	4	6	Sep 95	86	111	73/69	$3127	Pentium-120	16	1080
4 Micron P120 Millennia	3	9	June 95	86	111	75/68	$2899	Pentium-120	16	1278
5 HP Vectra VL 4 5/133	–	1	current	85	116	76/71	$3855	Pentium-133	16	1080
6 Micron P100 Millennia	5	7	Aug 95	85	107	75/68	$2629	Pentium-100	16	1278
7 NEC PowerMate P-133	–	1	current	85	111	72/66	$3299	Pentium-133	16	1624
8 Micron P166 Millennia Plus	–	1	current	85	113	75/68	$4796	Pentium-166	16	2150
9 CompuAdd C133MHz	7	3	Oct 95	84	119	71/67 [2]	$3517	Pentium-133	16	1624
10 Dell Dimension XPS P100c	6	7	Aug 95	84	100	73/69	$2710	Pentium-100	16	1083
11 Gateway 2000 P5-133XL	9	7	Aug 95	84	120	66/64	$3499	Pentium-133	16	1624
12 Gateway 2000 P5-120XL	8	9	June 95	84	113	66/64	$3199	Pentium-120	16	1624
13 Austin PowerPlus 120	10	3	Sep 95	82	108	64/69 [2]	$3207	Pentium-120	16	1278
14 Austin PowerPlus 133	12	4	Nov 95	82	112	64/69 [2]	$3807	Pentium-133	16	1624
15 DTK Quin-54M/P133	11	3	Dec 95	81	111	73/68	$3370	Pentium-133	16	1080
16 Tangent MediaStar 5133	13	4	Nov 95	81	126	[2]	$3295	Pentium-133	16	1080
17 Quantex QP5/133 SM-2	14	2	Jan 96	80	117	60/63	$3399	Pentium-133	16	1624
18 Polywell Poly 5150T3	–	1	current	80	111	[2]	$2799	Pentium-150	16	1080
19 Vektron Home Office Pro-P150	–	1	current	80	110	[2]	$2995	Pentium-150	16	1624
20 Maximus Magna Office	–	1	current	80	122	[2]	$4195	Pentium-166	32	1080

BEST BUY

[1] Call 800/434-4495 (for payment by Visa or MasterCard) or 900/903-2972 (for telephone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews ($4.95), a single capsule review plus features table and test report ($4.95), an entire month's review ($9.95), and a list of all systems tested by the PC World Test Center ($4.95). In addition, you can order next month's Top 20 charts and capsule reviews in advance (The Top 20 Flash

2 **Micron P133 Millennia**
Fastest of the Best Buys.

3 **Dell Dimension XPS P120c**
Almost as fast as its P-133 sibling.

4 **Micron P120 Millennia**
Very fast—very affordable.

5 **HP Vectra VL 4 5/133**
Newcomer with super reliability.

CD-ROM drive	Bus slots	Monitor size/ dot pitch	Vendor contact number	Fax reprint number [1]	Reader service no.	Comments (Recommended as home system)
4X	ISA, PCI	17"/.28	800/613-3355	3299	688	$149 drop puts fast, loaded P-133 with fine service and company reliability back on top.
6X	ISA, PCI	15"/.28	800/223-6571	3268	689	Speedy P-133 with 6X CD-ROM outperforms its new P-166 sibling.
4X	ISA, PCI	17"/.28	800/613-3355	3281	690	Quick, beautifully configured multimedia P-120 costs $153 less this month.
4X	ISA, PCI	15"/.28	800/223-6571	3242	691	Performance of affordable multimedia P-120 rivals P-133 systems.
4X	ISA, PCI	17"/.28	800/322-4722	3329	692	Well-designed and constructed, backed with superb company reliability and service.
4X	ISA, PCI	15"/.28	800/223-6571	3267	693	Price is down $170; great 100-MHz performance, solid configuration.
6X	ISA, PCI	15"/.28	800/632-4636	3330	694	Big hard drive and 6X CD-ROM drive add to a strong package.
6X	ISA, PCI	15"/.28	800/223-6571	3331	695	Loaded with storage, including a 1GB Iomega Jaz removable drive.
4X	ISA, PCI	15"/.28	800/627-1961	3307	696	Speedy, roomy minitower has big hard drive, high-quality components.
4X	ISA, PCI	17"/.28	800/613-3355	3265	697	Fast, big monitor, high company service and rating reliability. Sound is a $99 option.
4X	ISA, PCI	17"/.25	800/846-2000	3269	698	Superfast, with CD-ROM changer; costs $500 less this month.
4X	ISA, PCI	17"/.25	800/846-2000	3244	699	$100 price drop on hot performer with a CD-ROM changer.
4X	ISA, PCI	17"/.26	800/752-1577	3311	700	$106 price drop; full multimedia, fast modem.
6X	ISA, PCI	17"/.28	800/752-1577	3303	701	$392 price drop, but loaded system is still the most expensive P-133 here.
4X	ISA, PCI	17"/.26	800/289-2385	3306	702	Combines high-quality components with high reliability rating.
4X	ISA, PCI	17"/.28	800/342-9388	3300	703	Fastest desktop we've seen, and at a very attractive price.
4X	ISA, PCI	17"/.26	800/896-4898	3322	704	Very fast, good-quality components, full multimedia, and a modem.
6X	ISA, PCI	15"/.28	800/223-6571	3332	705	Low price, multimedia with a 6X CD-ROM drive.
6X	ISA, PCI	15"/.28	800/725-0026	3333	706	Good price, multimedia with 6X CD-ROM drive, big hard drive, fast modem.
4X	ISA, PCI	15"/.28	800/888-6294	3334	707	Fastest early P-166 comes with huge amount of RAM, long warranty.

Report, $9.95; available January 29). Touch-tone phone required. [2] We received fewer than 100 Reliability and Service Monitor responses for this company. Its ratings here are based on a combination of responses for it and for all companies for which we received 20 to 99 responses. (If we received fewer than 20 reliability or 20 service responses for a company, no score appears.)

For more information about all products in this table, circle reader service no. 907.

Top 20 Power Desktops

INTEL JUST INTRODUCED ITS NEW PENTIUM-150 and P-166 processors, and bang! four PCs using these faster chips made it onto our Power Desktops chart—not so much for blazing speed, as you would expect, but for low prices and great features. Both Polywell and Vektron are selling Pentium-150 systems for under $3000. The two Pentium-166 systems—from Micron and Maximus—are over $4000 but come with lots of memory or huge hard drives. The Micron P166 Millennia Plus, for example, has a mammoth 2.1GB hard drive as well as a new bus-mastering UltraSCSI adapter for the next generation of high-performance hard drives. (UltraSCSI drives should be available by the end of the spring.) The Micron also includes Iomega's new Jaz 1000MB removable hard drive. Extra drive cartridges for the Jaz cost only about $99. Price cutting also has stirred our Power Top 20 chart—prices dropped from $10 to $500 on more than half of the list. Gateway took $500 off its P5-133XL. Austin, Dell, and Micron also cut prices by over $100.

Best Buys this month are still P-133s and -120s from Dell and Micron, plus a newcomer—HP's Vectra VL 4 5/133. Dell reduced the price on its Dimension XPS P133c and P120c by about $150, allowing each to move ahead of its respective Micron competitor. Our last Power Top 20 newcomer this month is the NEC PowerMate P-133.

Dell Dimension XPS P133c

REVIEWED: November 1995

PROS: Fast performance, first-class components, excellent reliability and service records

CONS: On/off button looks too much like a floppy eject button

A $149 price drop to $3366 pushed this minitower back to the top after two months in the number two and three spots. Dell has packed the Dimension with quality components, including a big 1624MB Western Digital hard drive, an NEC quad-speed CD-ROM drive, Creative Labs' capable Sound Blaster AWE32 wavetable sound card, Number Nine's 9FX Motion771 graphics controller (which supports full-motion video software), and an internal U.S. Robotics 28.8-kbps V.34 fax-modem. This machine is fast and, except for the exposed power switch, nicely designed. Dell also offers one of the best service and support packages in the business, which is reflected in the high service and reliability scores the company gets from readers in our fax-back survey.

Micron P133 Millennia

REVIEWED: August 1995

PROS: Fast system with huge hard drive, 6X CD-ROM drive

CONS: None

Last month's top dog, the P133 Millennia, also had a price drop, but a small one—Micron knocked just $10 off its price, making it $3489. Although the Millennia is now a bit more expensive than the competing Dell, it's still hard to pick between the two. The P133 Millennia is faster and comes with a top-quality Plextor 6X CD-ROM drive. Otherwise, the two systems are fairly equal, with 16MB of EDO RAM, big 1624MB Western Digital hard drives, and all the multimedia trimmings—although Micron's unit lacks a modem. Micron's software bundle—which includes Microsoft Office Professional—adds to the system's great value. If you want to upgrade your Millennia from the 15-inch display to 17 inches, however, it will cost you an extra $300.

This month we looked at Micron's home version of the P133 Millennia—the P133 Home MPC Pro. Space limitations and the substantial similarity between it and the Millennia prevent us from giving it a full write-up. It matches the Millennia's performance, configuration, and software bundle, except that it comes with a smaller 1275MB hard drive and a larger 17-inch monitor. In addition, Micron throws in a 14.4-kbps fax-modem and one of Teac's new 6X CD-ROM drives. Priced at a reasonable $3499, this machine is an excellent deal and deserves as sterling a ranking as a power home PC as the Millennia earns as a business machine.

Dell Dimension XPS P120c

REVIEWED: September 1995

PROS: Great performance, 28.8-kbps fax-modem, full multimedia

CONS: Poorly designed on/off button

Last month Dell dropped the price of its Pentium-120 Dimension by more than $400; this month it knocked off another $153, to $3127. This powerful minitower's performance rivals that of many Pentium-133s, and like the Dimension XPS P133c, it has impressive features: 16MB of EDO RAM, a 17-inch monitor, a 28.8-kbps fax-modem, and a 2MB VRAM Number Nine 9FX Motion771 graphics board with support for full-motion video acceleration.

Micron P120 Millennia

REVIEWED: June 1995

PROS: Very fast P-120 performance, excellent expandability, full multimedia

CONS: None

The $2899 price of the P120 Millennia was unchanged this month, but it's still a couple of hundred dollars cheaper than Dell's P-120. Although the Dell system edged out the Millennia in service and

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expandability, Micron's P120 has a somewhat larger 1278MB hard drive, a slightly higher reliability rating, and some of the same high-quality components, including 16MB of EDO RAM and a 64-bit Diamond Stealth64 PCI graphics card with 2MB of VRAM. As with the P133 Millennia, you will have to add another $300 to your purchase if you want to get a 17-inch monitor.

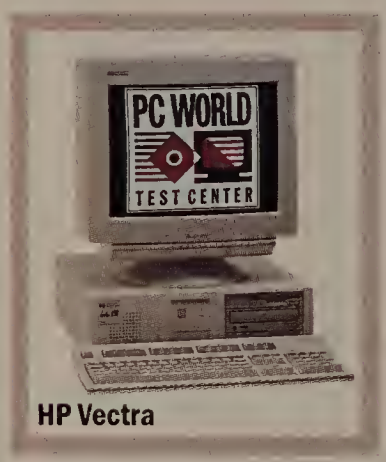
5 HP Vectra VL 4 5/133

NEW THIS MONTH

PROS: Excellent reliability and service ratings, three-year warranty

CONS: Limited expandability, some internal clutter hinders accessibility

Hewlett-Packard's Vectra line is known for high-quality, nicely put together systems—and the P-133 Vectra VL, a compact desktop, maintains that reputation as the only new Best Buy on this month's Power chart. Many HP systems we've reviewed in the past have not been speed demons, but the Vectra VL 4 5/133—with 16MB of RAM—is quick for a Pentium-133. (A poor score on WordPerfect for DOS initially lowered the unit's overall performance, but our Test Center saw a dramatic improvement after removing drivers loaded in low memory.) Its $3855 price is higher than those of comparably equipped Dell and Micron models, but its reliability and service are also better, according to the responses to our fax-back survey. The Vectra comes with a three-year parts and labor warranty and some of the best documentation we have seen. Calls we've made to tech support indicate that HP's technicians are very knowledgeable; support lines are open 11 hours a day. Instead of contracting with an outside on-site service provider, Hewlett-Packard provides its own, and HP's service enjoys a reputation as one of the best.



HP Vectra

The Vectra's straightforward configuration includes a fast 1080MB Quantum Fireball hard drive and a solid 2MB PCI Matrox Millennium graphics adapter that's a good match for the 17-inch HP Ultra VGA 1280-D2817A monitor. To allow you to handle multimedia applications, Hewlett-Packard bundles a quad-speed Sony CD-ROM drive and a Creative Labs Vibra 16S sound card. Even the keyboard and mouse that come with the Vectra VL P-133 are sturdily built and and seem of a higher quality than you'll find with many systems.

Unfortunately, the compact case has limited space for adding adapters and peripherals. Only one of the two free drive bays is externally accessible, and the expansion slots are on a riser card that's partially blocked by the graphics adapter. There's only one open ISA slot, plus one slot that can fit either a PCI or an ISA card.

6 Micron P100 Millennia

REVIEWED: August 1995

PROS: One of the fastest P-100s, 1278MB hard drive, full multimedia

CONS: None

7 NEC PowerMate P-133

NEW THIS MONTH

PROS: 6X CD-ROM drive, integrated sound, three-year warranty

CONS: Recessed floppy drive bay is hard to use

Debuting at number seven, the $3299 NEC PowerMate P-133 is a strong system amid fierce competition. Its configuration ranks among the best, but its performance wasn't quite as good in comparison. Still, equipped with a Pentium-133 CPU, 16MB of EDO RAM, and 256K of pipeline-burst secondary cache, it finished among the top third of its CPU class in our test suite.

NEC PowerMate

The system features Intel's latest motherboard, the Endeavor, which integrates a 16-bit Creative Labs sound chip. NEC also provides a cavernous 1624MB hard drive and its own brand of SCSI 6X CD-ROM player. However, the integrated S3 Trio–based video subsystem—which is capable of 1280-by-1024 resolution and has 2MB of DRAM—exceeds the capabilities of the 15-inch NEC Multisync XE15 monitor that comes with it.

The Powermate P-133's minitower case is roomy and solidly constructed. Three PCI slots and one ISA slot are free, with another slot that can take either a PCI or an ISA card. In our test unit, two of the four SIMM slots were open and easily accessible for adding memory. Two externally accessible 5.25-inch drive bays are available for adding more devices.

We have only a couple of complaints. The floppy drive bay is deeply recessed within the PowerMate's sculpted case, so the eject button is hard to reach. Touch typists may not mind the light-colored lettering on the keyboard, but those who hunt and peck may have some trouble.

NEC earns good marks in our reliability and service fax-back reader survey. The company backs its systems with an excellent three-year parts and labor warranty and 24-hour, toll-free telephone support. The two-tiered documentation explains the basics in paper manuals, with more technical information in preinstalled Windows help files.

8 Micron P166 Millennia Plus

NEW THIS MONTH

PROS: Excellent reliability and service rating, three-year warranty, 2150MB SCSI hard drive, 1084MB removable cartridge SCSI drive

CONS: Performance somewhat slow for a P-166, expensive

The Micron P166 Millennia Plus minitower system's high price—$4796—isn't surprising for a machine loaded with SCSI storage options and one of the latest Intel processors, but this PC is not as fast as we expected. In fact, it was slower than Micron's P133. (Pentium-150 and P-166 systems should improve as hardware vendors fine-tune their components.) This is still a fairly fast system, though, and if it had an IDE hard drive, it would probably have somewhat faster benchmarks on single tasks. But with its bus-mas-

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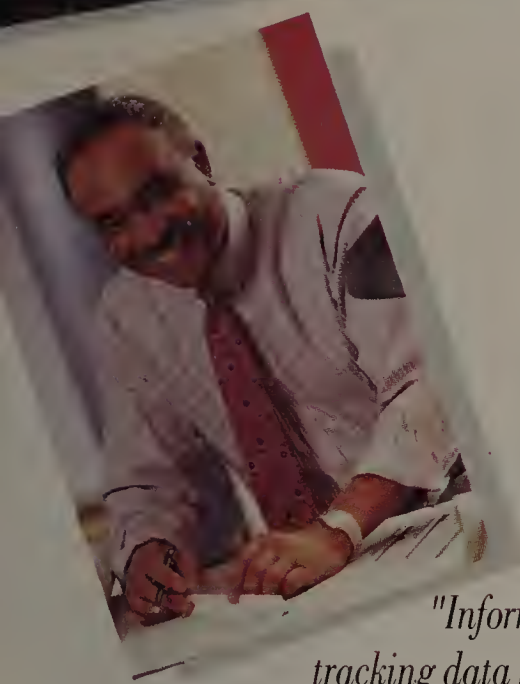

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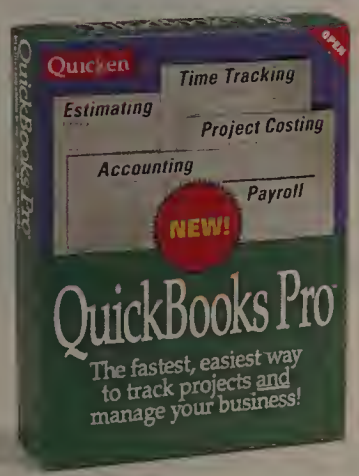

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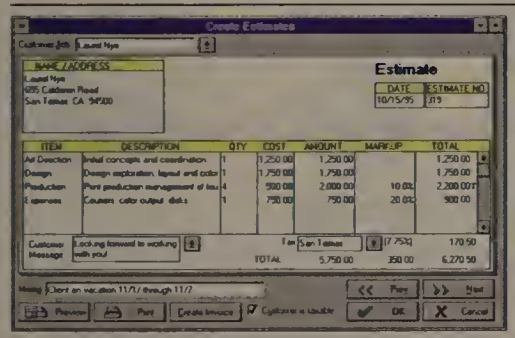

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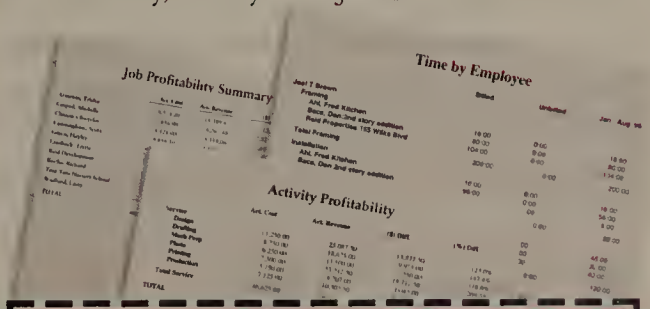

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tering SCSI hard drive adapter—which has the capability to queue and complete multiple I/O requests—multitasking should be its forte. For example, when you're transferring or archiving files in the background and simultaneously assembling a report using your office suite, the adapter will handle many of the multiple I/O transactions—freeing your CPU to efficiently run your word processor and spreadsheet programs in the foreground.

Our Millennia came with 16MB of EDO RAM and 256K of pipeline-burst secondary cache, plus other goodies such as its 6X Plextor SCSI CD-ROM drive. But the big story—aside from its powerhouse CPU—is storage. This system comes with a huge 2150MB Quantum SCSI-2 hard drive *and* an Iomega Jaz 1000MB SCSI-2 hard drive. The Jaz drive runs at the speed of a fast hard drive, and its disk cartridges are easily removable. Even better, you can buy new cartridges for about $99 each on the street. The BusLogic FlashPoint LT SCSI card that controls all of these SCSI devices is one of the first to support UltraSCSI. When standard UltraSCSI (or SCSI-3) drives are available early this year, they will be rated to handle data transfers at up to 20MB per second, compared with SCSI-2's 10MB per second. (Wide versions of SCSI-2 and SCSI-3 deliver twice these transfer rates.) Since this SCSI controller also complies with the SCAM (SCSI Configured Automatically) standard for Plug and Play installation of SCSI devices, it should be a simple matter to add an UltraSCSI drive to your device chain. The controller will simultaneously support older standard devices and newer drives, handling transfers to each at their optimum rates.

Micron P166

The graphics subsystem is solid, although it would be nice to have a larger monitor on a system this expansive. You get a sharp-looking Micron 15FGx 15-inch monitor, well matched with a 2MB VRAM Diamond Stealth 64 graphics card. The P166 Millennia Plus has only one free externally accessible 5.25-inch drive bay and one internal 3.5-inch bay, but fortunately the SCSI adapter makes adding external devices easy. Of the five open expansion slots, one is PCI and another can take either a PCI or an ISA card. Two of the four SIMM sockets are available for adding more RAM. Despite slower-than-expected performance, this system is still a strong value, thanks to a bevy of useful features and Micron's high reliability and service ratings from our reader fax-back surveys.

9 CompuAdd C133MHz

REVIEWED: October 1995

PROS: Excellent P-133 performance

CONS: No free SIMM sockets, one-year warranty

10 Dell Dimension XPS P100c

REVIEWED: August 1995

PROS: Good P-100 performance, terrific reliability and service

CONS: On/off button can be mistaken for the floppy eject button, no sound

11 Gateway 2000 P5-133XL

REVIEWED: August 1995

PROS: Large $500 price drop to $3499, great Pentium-133 performance, big 1624MB hard drive, fine multimedia package

CONS: No set time policy on repair turnarounds

12 Gateway 2000 P5-120XL

REVIEWED: June 1995

PROS: $100 price drop to $3199, as fast as many P-133s, 1624MB hard drive, full multimedia

CONS: No set time policy on repair turnarounds

13 Austin PowerPlus 120

REVIEWED: September 1995

PROS: Price dropped by $106 to $3207, 28.8-kbps fax-modem, 1278MB hard drive

CONS: Some cable clutter

14 Austin PowerPlus 133

REVIEWED: November 1995

PROS: 1624MB hard drive, 6X CD-ROM drive, good tech support policies

CONS: Still somewhat pricey at $3807, no free SIMM sockets for inexpensive RAM upgrades

15 DTK Quin-54M/P133

REVIEWED: December 1995

PROS: Reasonable $3370 price, full multimedia configuration, highly rated reliability

CONS: Documentation could be better, no weekend tech support

16 Tangent MediaStar 5133

REVIEWED: November 1995

PROS: Still the fastest system we've ever tested, even beating P-150s and P-166s, with a good price for a Pentium-133—$3295—and fine-quality multimedia components

CONS: No applications software bundle

17 Quantex QP5/133 SM-2

REVIEWED: January 1996

PROS: Excellent P-133 performance, 1624MB hard drive, 28.8-kbps fax-modem, great multimedia and software bundle, including Novell PerfectOffice

CONS: One-year warranty, some internal cable clutter, limited add-in card options, below-average reliability rating from our fax-back survey

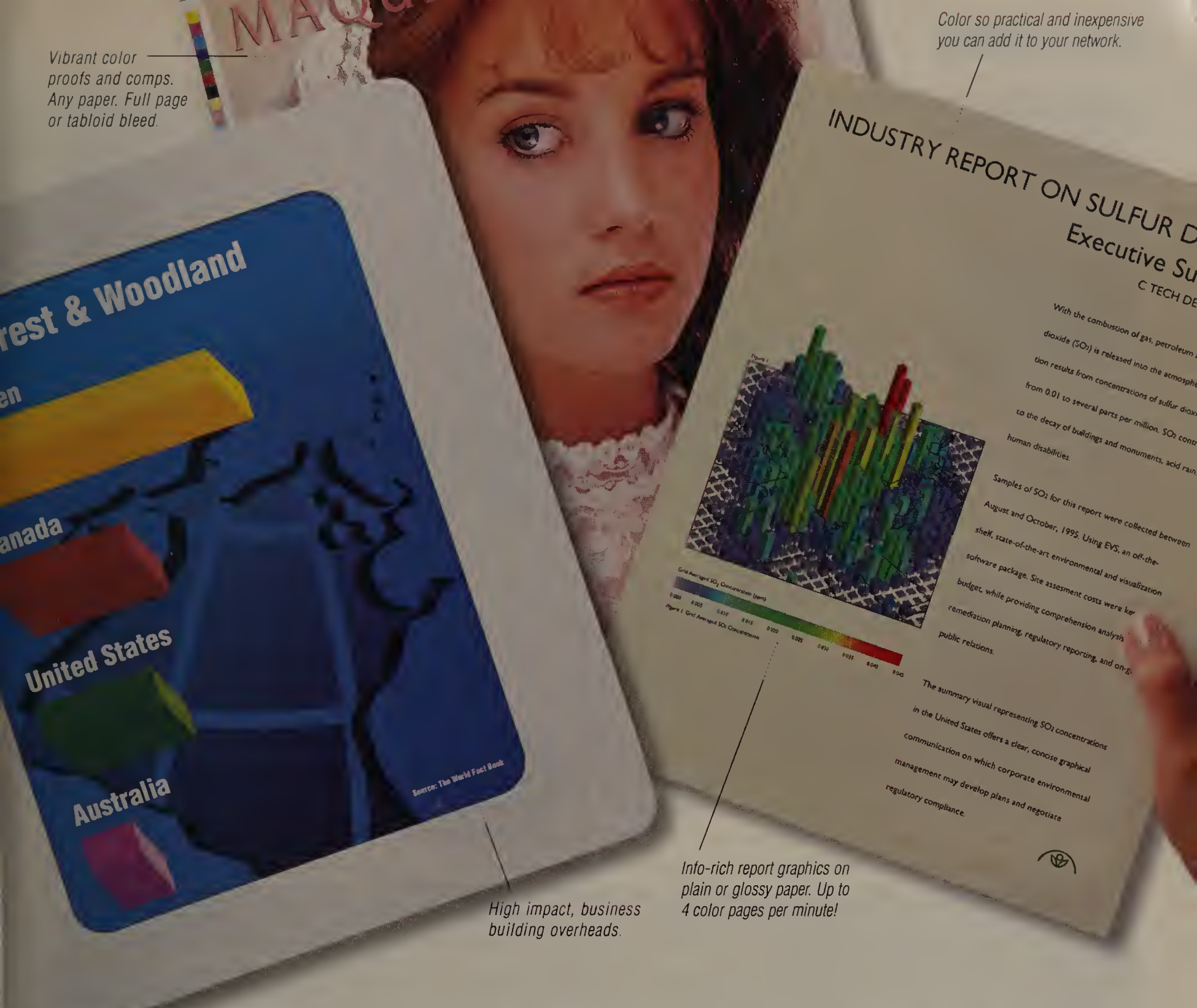
18 Polywell Poly 5150T3

NEW THIS MONTH

PROS: Three-year parts and five-year labor warranty, 6X CD-ROM drive, four free SIMM slots for easy RAM expandability

CONS: Anti-glare coating makes monitor images somewhat indistinct

The Polywell Poly 5150T3 is one of the early Pentium-150 and Pentium-166 systems we reviewed this month, and like the other early 150 PCs, it's not as fast as we expected. Running with 16MB



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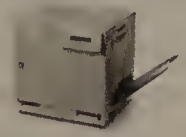
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of EDO RAM and 256K of pipeline-burst secondary cache, its performance was more like that of a quick Pentium-133. However, this Polywell still earns a spot on the Power Desktops Top 20, as it offers a solid configuration for a very low $2799 price.

Polywell

The Polywell's minitower case includes a quick 1080MB Quantum Fireball hard drive, a 6X CD-ROM drive, a Creative Labs Vibra 16 sound card, and a nice pair of Yamaha speakers. You also get an excellent 2MB Diamond Stealth 64 graphics adapter. (However, the original card in the review unit we were sent failed to complete our test suite, so we had to substitute an older card and drivers to complete testing.)

One aspect of the graphics subsystem was somewhat disappointing: We noticed that text was not as readably crisp or graphics as vivid as we've seen on most other monitors.

The Polywell's four free drive bays, three of which are are externally accessible, allow for the addition of plenty of drives. There's also plenty of room for expansion cards, with six open slots, including three that are PCI and one that can take either a PCI or an ISA card. One aspect of the expandability of this system really shines: There are four free memory sockets available for putting in extra RAM, whereas most systems have just two free.

Polywell's system manual lacks style and has a very generic appearance, but it provides a useful supplement to the technical component manuals and gives general guidance on system usage and troubleshooting. Polywell's three-year parts, five-year labor warranty is commendable, and the company's technicians have rarely flubbed our questions when we called.

19 Vektron Home Office Pro-P150

NEW THIS MONTH

PROS: Extensive features include 1624MB hard drive, 28.8-kbps voice fax-modem

CONS: One-year warranty

The benchmarks achieved by this system fit neatly into this month's saga of fairly sedate Pentium-150s, looking remarkably like those of a Pentium-133. Nevertheless, the Vektron's configuration is one of the best we've seen, especially for its $2995 price.

Vektron

Vektron packed this system with a strong set of components, starting with 16MB of RAM and 256K of secondary cache. The company leaves you well equipped for Windows 95 applications and for multimedia with a 1624MB Western Digital hard drive, a 6X CD-ROM drive, a Creative Labs Sound Blaster AWE32 sound card, and an internal 28.8-kbps internal voice fax-modem. Vektron bundles several communication and voice-enabling miniapplications with the modem, as well. A Matrox MGA Millennium graphics card with 2MB of WRAM pairs with a crisp-looking, 15-inch MAG monitor. The minitower case offers lots of expandability. Three of the four open drive bays are externally accessible, and the five free expansion slots include three that can take PCI cards.

The Vektron P-150 seems solid in many ways, but we can't give you an accurate picture of how readers rate the quality of Vektron's reliability and service, as we have so far received too few reader responses to our fax-back survey. Consequently, this unit receives a score that is based on an average of the totals from all companies for which we've received a low number of responses. Vektron's documentation is fairly well organized and written, but its one-year warranty is meager by today's standards.

20 Maximus Magna Office

NEW THIS MONTH

PROS: Very fast, four-year warranty, lots of free drive bays and expansion slots

CONS: Mismatched monitor and graphics adapter, blocked SIMM sockets

Neither of the early Pentium-166 systems debuting this month performed as fast as we expected, but the Maximus P-166 was the faster of the two, coming fairly close to the best performance benchmarks that we've recorded. With 32MB of EDO RAM and 256K of pipeline-burst secondary cache, the Maximus was the third-fastest system we've ever tested and noticeably faster than the average P-133. But the two PCs beating it were both Pentium-133s, and the fastest—the Tangent MediaStar 5133—rates as number 16 on this month's Power Desktops chart.

Maximus

The Maximus is also less expensive than Micron's P-166 offering, with an estimated street price of $4195. Even with these advantages, however, the unit just squeaks into the bottom of the Top 20 charts; it does not offer the impressive storage options of the Micron P166 Millennia Plus, nor can it boast the same high reliability and service scores.

Inside the cavernous full tower of the Maximus system, you'll find a fairly standard power desktop configuration: a 1080MB hard drive, a quad-speed CD-ROM drive, and a 16-bit Sound Blaster AWE32 sound card from Creative Labs. A pair of 14-watt stereo speakers rounds out the sound system. The PCI video card is an eye-catcher: a Number Nine Imagine 128 with 4MB of VRAM. However, its capabilities far exceed those of the 15-inch monitor that Maximus sells with the system.

Our Maximus had six free drive bays (three externally accessible) and four open expansion slots (of which three are PCI). The system's 32MB of RAM is already higher than the current norm, so you probably won't need to upgrade soon. But if you do, the two available SIMM sockets lie hidden behind an interior drive bay and are hard to reach.

Maximus offers a four-year parts and labor warranty for its systems. This is one of the longest warranties we've seen, but we don't yet have enough data on the company's reliability and service to know how well its products are covered in actuality.

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THE TOP 20

PC WORLD

BUDGET DESKTOPS

1 **Dell Dimension XPS P90**
Fast, big monitor; small price.

		Last month	Months on chart	First reviewed	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	Dell Dimension XPS P90	4	2	Sep 95	85	93	73/69	$2193	Pentium-90	8	1080
2	Dell Dimension P75t	1	3	Dec 95	85	75	73/69	$1679	Pentium-75	8	540
3	Micron 4100 Magnum	2	7	Aug 95	85	70	75/68	$1690	DX4-100	8	1278
4	DTK Quin-35M/P75	3	7	Aug 95	82	70	73/68	$1850	Pentium-75	8	1083
5	Micron P90 Home MPC	4	7	Aug 95	82	74	75/68	$2099	Pentium-90	8	850
6	Gateway 2000 P5-100	14	3	Nov 95	81	104	66/64	$2359	Pentium-100	16	1084
7	Quantex QP5/100 M-3	—	1	current	80	96	60/63	$2199	Pentium-100	16	1083
8	CompuTrend Premio 5x86-100	6	2	Jan 96	80	77	[2]	$1799	Cx5x86-100	16	1080
9	Gateway 2000 P5-75	7	3	Dec 95	80	67	66/64	$1739	Pentium-75	8	850
10	Gateway 2000 P5-120	8	2	Dec 95	80	110	66/64	$2499	Pentium-120	16	1083
11	Digital Venturis 575	20	3	Sep 95	80	82	75/67	$2019	Pentium-75	8	425
12	MicroExpress MicroFlex-PCI/586	9	2	Jan 96	80	70	63/61 [2]	$1799	Cx5x86-100	16	1080
13	Vektron Multimedia P-100	10	2	Jan 96	80	88	[2]	$1995	Pentium-100	8	852
14	Tempest Pentium Giga Media P5-100	11	2	Jan 96	80	86	[2]	$1988	Pentium-100	16	1270
15	CompuAdd CP90p Mini-Tower	—	1	June 95	79	88	71/67 [2]	$2413	Pentium-90	16	850
16	Netis 5100 Media	13	2	Jan 96	79	103	[2]	$2390	Pentium-100	16	1624
17	Vektron PCI P-75	11	8	July 95	79	74	[2]	$1595	Pentium-75	8	852
18	Quantex QP5/75 M-1	17	6	Sep 95	79	65	60/63	$1699	Pentium-75	8	1083
19	Polywell Poly 4120P8	15	3	Dec 95	79	73	[2]	$1895	AmDX4-120	8	1080
20	Compaq ProLinea 575	16	3	Sep 95	79	69	77/72	$1959	Pentium-75	8	630

BEST BUY

[1] Call 800/434-4495 (for payment by Visa or MasterCard) or 900/903-2972 (for telephone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews ($4.95), a single capsule review plus features table and test report ($4.95), an entire month's review ($9.95), and a list of all systems tested by the PC World Test Center ($4.95). In addition, you can order next month's Top 20 charts and capsule reviews in advance (The Top 20 Flash

2 Dell Dimension P75t
Reliable and inexpensive.

3 Micron 4100 Magnum
Great price for full multimedia.

4 DTK Quin-35M/P75
Low-cost, reliable tower.

5 Micron P90 Home MPC
Affordable and well equipped.

CD-ROM drive	Bus slots	Monitor size/ dot pitch	Vendor contact number	Fax reprint number [1]	Reader service no.	Comments (Recommended as home system)
4X	ISA, PCI	17"/.28	800/613-3355	3282	708	$306 price drop on fast, reliable minitower; $99 extra to add sound.
4X	ISA, PCI	15"/.28	800/613-3355	3313	709	Inexpensive and from reliable company, but very small hard drive. Sound costs $99 extra.
4X	ISA, PCI	15"/.28	800/223-6571	3273	710	$109 price drop, multimedia, and big hard drive help keep last DX4-100 a Best Buy.
4X	ISA, PCI	15"/.28	800/289-2385	3274	711	Good P-75 performance, attractive price, fine company system reliability rating.
4X	ISA, PCI	15"/.28	800/223-6571	3275	712	Full multimedia, fax-modem, and software bundle make P-90 suited for home.
4X	ISA, PCI	15"/.25	800/846-2000	3314	713	$120 price drop on exceptionally fast, inexpensive P-100 unit. Sound costs $99 extra.
4X	ISA, PCI	15"/.28	800/896-4898	3335	714	Inexpensive, well-configured, though Quantex systems' reliability is below average.
4X	ISA, PCI	15"/.28	800/677-6477	3323	715	Cyrix's low-cost processor helps inexpensive multimedia system run like a fast P-75.
4X	ISA, PCI	15"/.25	800/846-2000	3317	716	Bare-bones configuration has no secondary cache (even as an option), lacks sound.
4X	ISA, PCI	15"/.28	800/846-2000	3309	717	Still the fastest Budget Top 20 PC and the only P-120 here. Sound costs $99 extra.
4X	ISA, PCI	14"/.28	800/722-9332	3328	718	$150 price drop on quick P-75; small monitor and hard drive.
4X	ISA, PCI	15"/.28	800/989-9900	3324	719	Pentium-75–level performance and good Windows 95 configuration at low price.
4X	ISA, PCI	15"/.28	800/725-0026	3325	720	Great deal for multimedia machine with 4MB of video memory.
4X	ISA, PCI	15"/.28	800/818-5163	3326	721	Incredible price on multimedia PC, considering all the memory and storage.
4X	ISA, PCI	15"/.28	800/627-1961	3327	722	$300 price drop puts P-90 on budget chart, plenty of RAM, but hard drive could be bigger.
4X	ISA, PCI	15"/.28	800/577-7526	3327	723	Fast, loaded—perhaps the greatest bang for your buck on the chart.
—	ISA, PCI	15"/.28	800/725-0026	3257	724	Great price for fast Pentium-75 desktop, but no CD-ROM drive or sound.
4X	ISA, PCI	15"/.28	800/896-4898	3284	725	Multimedia, larger hard drive make a good value.
4X	ISA, PCI	15"/.28	800/999-1278	3316	726	Strong, low-cost alternative to Intel-based systems performs like a Pentium-75.
—	ISA, PCI	15"/.28	800/345-1518	3318	727	Small hard drive and no CD-ROM drive, but great support from industry leader.

Report, $9.95; available January 29). Touch-tone phone required. [2] We received fewer than 100 Reliability and Service Monitor responses for this company. Its ratings here are based on a combination of responses for it and for all companies for which we received 20 to 99 responses. (If we received fewer than 20 reliability or 20 service responses for a company, no score appears.)

For more information about all products in this table, circle reader service no. 908.

Top 20 Budget Desktops

A FAST PENTIUM-90 WITH A 17-INCH MONITOR for just $2193 would have seemed an impossible dream last month. Now that's the price of the Dell Dimension XPS P90 (with no sound or modem): A $306 price drop puts this budget heavyweight at the top of the chart. Dell and Micron dominate the Best Buys. Micron's P90 Home MPC—number five—is a good value at $2099 if you're looking for a complete multimedia system with a modem (although it's nowhere near as fast as the Dell P-90). Three Best Buys cost $1850 or less: Dell's Dimension P75t at $1679, Micron's 4100 Magnum at $1690, and DTK's Quin-35M/P75 at $1850.

Only one contender this month made it onto the Budget chart—a fast Pentium-100 multimedia system from Quantex. Like most Quantex packages, the QP5/100 M-3 comes with a modem. At just $2199 with 16MB of RAM and a 1083MB hard drive, it's a deal that would have made a shoo-in as a Best Buy—if the company had received higher reader fax-back scores for reliability.

Dell Dimension XPS P90

REVIEWED: September 1995

PROS: Fast P-90 performance, 17-inch monitor, three-year parts warranty

CONS: On/off switch looks too much like a floppy eject button

In budget systems, a low price combined with top performance is the number one commodity. A $306 price drop to $2193 puts this former Power Desktops Best Buy at the head of the budget class. With its 17-inch monitor and a great price, you may have room in your budget to order it with more than the 8MB of RAM ours had. It comes with a 1080MB hard drive and a quad-speed CD-ROM drive, but you'll need to spend an extra $99 to add sound. A modem is also an added-cost option. In our fax-back polls, Dell has a consistently fine rating for reliability and service.

Dell Dimension P75t

REVIEWED: December 1995

PROS: Low price, good performance, three-year parts warranty

CONS: On/off button looks like a floppy eject button, no sound

If your budget is tight, $1679 gets you a quick, reliable Pentium-75 minitower. At this price, however, you get a short list of features: 8MB of RAM, a very small 540MB hard drive, and a 15-inch monitor. The system comes with a quad-speed CD-ROM drive, but you'll pay extra for sound and a modem.

Micron 4100 Magnum

REVIEWED: August 1995

PROS: Very fast for a DX4-100, big hard drive, full multimedia

CONS: 32MB RAM maximum

This month the Micron 4100 Magnum's price dropped again—down $109 to an appealing $1690. It's still a bit higher in cost than Dell's Dimension P75t, but the Magnum comes with a roomy 1278MB hard drive, a full set of multimedia components, and performance that's as good as that of many Pentium-75s. Furthermore, Micron's reliability and service ratings are excellent. Order the 4100 Magnum with an optional modem, and you'll have a complete starter system.

DTK Quin-35M/P75

REVIEWED: August 1995

PROS: Good price, solid P-75 performance

CONS: Cluttered motherboard, no money-back guarantee

The $1850 DTK Quin-35M/P75 comes with 8MB of RAM, a 1083MB hard drive, a quad-speed CD-ROM drive, and sound (a modem costs extra). Readers who responded to our survey rate DTK's reliability on par with some of the top vendors. Unfortunately, if you don't like the system or it just won't work right, DTK won't refund your money—it will only send a replacement.

Micron P90 Home MPC

REVIEWED: August 1995

PROS: Great price for a complete PC package

CONS: Performance more like a P-75's than a P-90's

Micron's Pentium-90 home PC costs just $2099 for a system with 8MB of RAM, an 850MB hard drive, a quad-speed CD-ROM drive, sound, and a 15-inch monitor. Other features include a 2MB DRAM Diamond Stealth64 graphics controller and a 14.4-kbps U.S. Robotics fax-modem.

Gateway 2000 P5-100

REVIEWED: November 1995

PROS: $120 price drop to $2359, 16MB of RAM, fast P-100 performance, big hard drive, lots of software, three-year warranty

CONS: Sound card and speakers cost extra

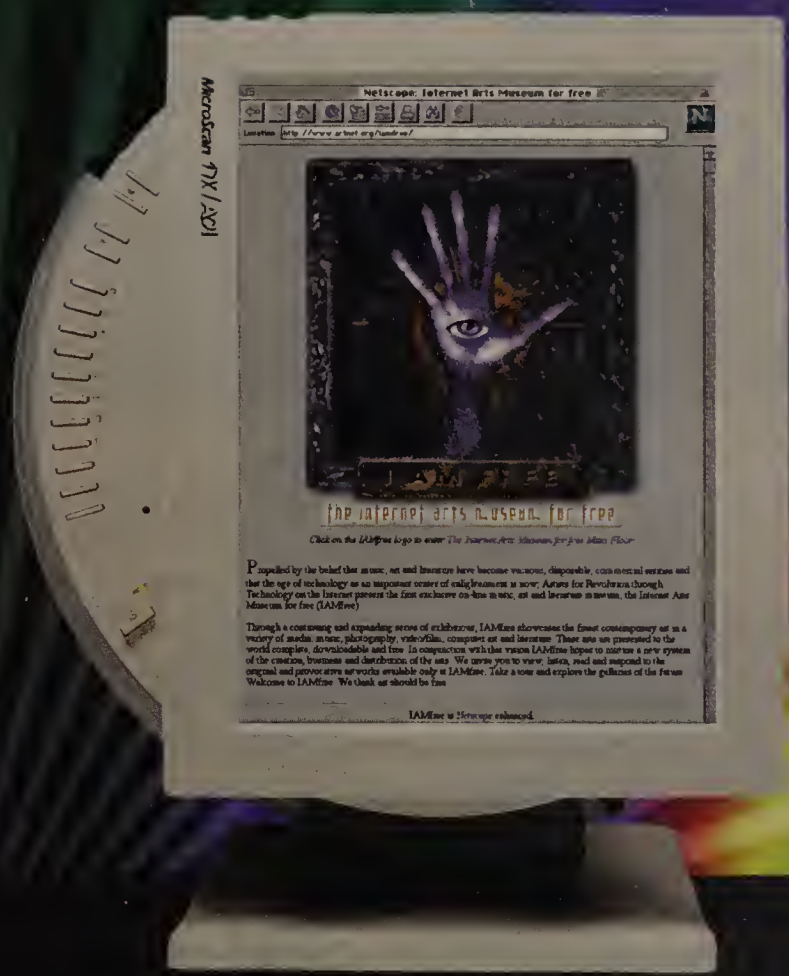
Quantex QP5/100 M-3

NEW THIS MONTH

PROS: Good performance, excellent CD-ROM bundle

CONS: Poor reliability ratings, mediocre system manual

At $2199, the Quantex QP5/100 M-3 hits our Budget Top 20 list at number seven—not a Best Buy, but pretty close considering its



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The MicroScan 17X is like getting a 21" display for the price of a 17" monitor. Its vertical viewing area in portrait mode is larger than any 17" or even 21" monitor on the market, and easily accommodates an entire 8.5" x 11", legal or A4 page in portrait view. No need to scroll or print to see the whole page. This means you'll be able to do twice as much in half the time.

High-Quality Feature Set

The MicroScan 17X also has many other things to flip over. Like a 17" CRT display with a 16" diagonal viewing area, 1024 x 768 resolution, flicker-free 76Hz performance, .28mm dot pitch, microprocessor digital controls, even Plug-n-Play compatibility. It's a feature set you won't find in competitively priced monitors. And since ADI builds monitors for leading PC companies worldwide, you know you're making a quality investment for the long haul. The MicroScan 17X is also backed by a three-year warranty. Best of all, you don't have to be a Web Master to get one. Just call 1-800-228-0530 for your nearest dealer.

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Circle 3 on reader service card

loaded feature set. Not every PC—especially not every *budget* PC—comes with applications software. The Quantex comes with a nice bundle of home-oriented CD-ROMs, including Intuit's Quicken, Compton's Interactive Encyclopedia, Family Pharmacist, and WordPerfect's MainStreet suite, among others, making this system well suited to be a good family buy. With a Pentium-100 CPU, 16MB of EDO RAM, and 256K of pipeline-burst secondary cache, it had average performance. Unfortunately, a somewhat poor reliability rating lowered its overall rating.

The minitower case houses a 1083MB hard drive, a quad-speed CD-ROM drive with sound card, and a 14.4-kbps internal voice fax-modem that has accompanying voice-enabling software. The STB PowerGraph 64 video card with 1MB of DRAM is a fairly good match for the 15-inch monitor—although we recommend 2MB of graphics RAM, even in a budget PC. The monitor's 72Hz refresh rate is okay, but the STB card is capable of twice that rate.

Quantex

The QP5/100 M-3 is quite expandable with four open drive bays, two of which are externally accessible. In addition, you get two PCI slots and two 16-bit slots for adding expansion cards.

The documentation could be better, as the system manual is vague and short on useful details. Quantex offers a minimal one-year standard warranty, and technical support is available only during business hours. While the company gets a near-average service rating from readers who respond to our fax-back survey, the reliability of its systems scored lower.

8 CompuTrend Premio 5x86-100

REVIEWED: January 1996

PROS: Cx5x86-100 performs like a fast P-75, great $1799 price, 16MB of RAM, full multimedia

CONS: Premio monitor has low refresh rates, is poor match for the 2MB Number Nine 9FX Motion531 graphics card, has no weekend tech support

9 Gateway 2000 P5-75

REVIEWED: December 1995

PROS: Low $1739 price, fine monitor, good hard drive

CONS: No secondary cache option, no sound card or speakers

10 Gateway 2000 P5-120

REVIEWED: December 1995

PROS: Terrific $2499 price tag for a P-120, 16MB of RAM, big hard drive

CONS: No sound card or speakers

11 Digital Venturis 575

REVIEWED: September 1995

PROS: Price down to $2019, excellent P-75 speed, super reliability

CONS: Tiny 425MB hard drive, small 14-inch monitor

12 Micro Express MicroFlex-PCI/586

REVIEWED: January 1996

PROS: Low $1799 price, 16MB of RAM, good speed from Cx5x86-100 CPU

CONS: No sound card or speakers

13 Vektron Multimedia P-100

REVIEWED: January 1996

PROS: Great $1995 price includes 4MB of video memory and 14.4-kbps voice fax-modem

CONS: One-year warranty

14 Tempest Pentium Giga Media P5-100

REVIEWED: January 1996

PROS: For a low $1998 price, you get a complete multimedia system with a good-size 1270MB hard drive and 14.4-kbps fax-modem

CONS: Low-quality monitor, one-year parts warranty

15 CompuAdd CP90p Mini-Tower

REVIEWED: June 1995

PROS: Fine P-90 performance, 16MB of RAM, very expandable, high reliability

CONS: No software applications bundle

16 Netis 5100 Media

REVIEWED: January 1996

PROS: Attractive $2390 price for a fast multimedia Pentium-100 system with a generous 16MB of RAM and a 1624MB hard drive

CONS: Crowded interior, one-year parts warranty

17 Vektron PCI P-75

REVIEWED: July 1995

PROS: $1595 price is lowest here, solid P-75 performance

CONS: No CD-ROM drive or sound, one-year warranty, no weekend tech support

18 Quantex QP5/75 M-1

REVIEWED: September 1995

PROS: Just $1699 for multimedia PC with fax-modem and lots of software

CONS: One-year warranty, limited expandability options

19 Polywell Poly 4120P8

REVIEWED: December 1995

PROS: Good $1895 price for multimedia AmDX4-120 that's as fast as a P-75

CONS: Cluttered interior makes upgrading difficult

20 Compaq ProLinea 575

REVIEWED: September 1995

PROS: Well-built $1959 system from company with excellent service and reliability

CONS: No CD-ROM drive, small 630MB hard drive

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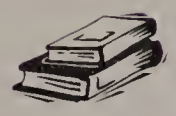

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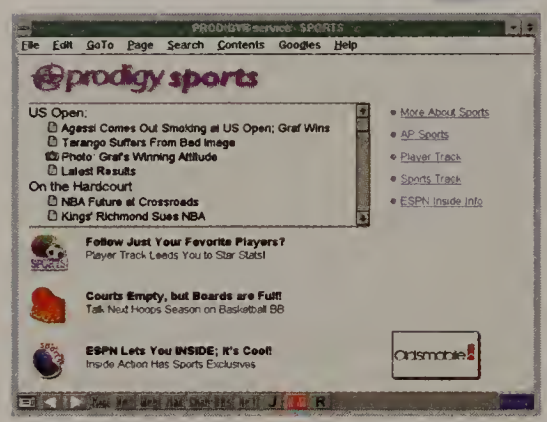

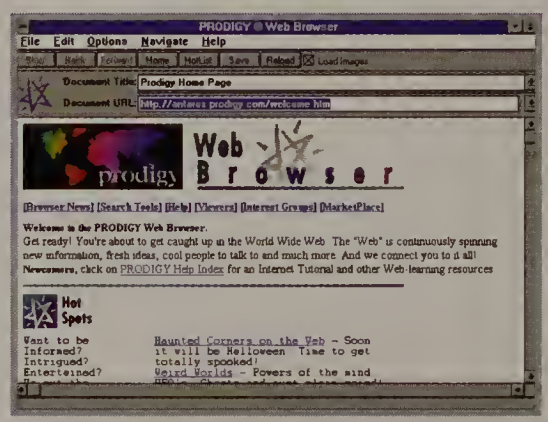

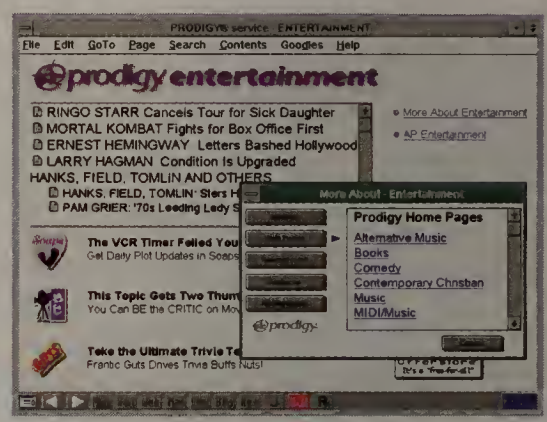

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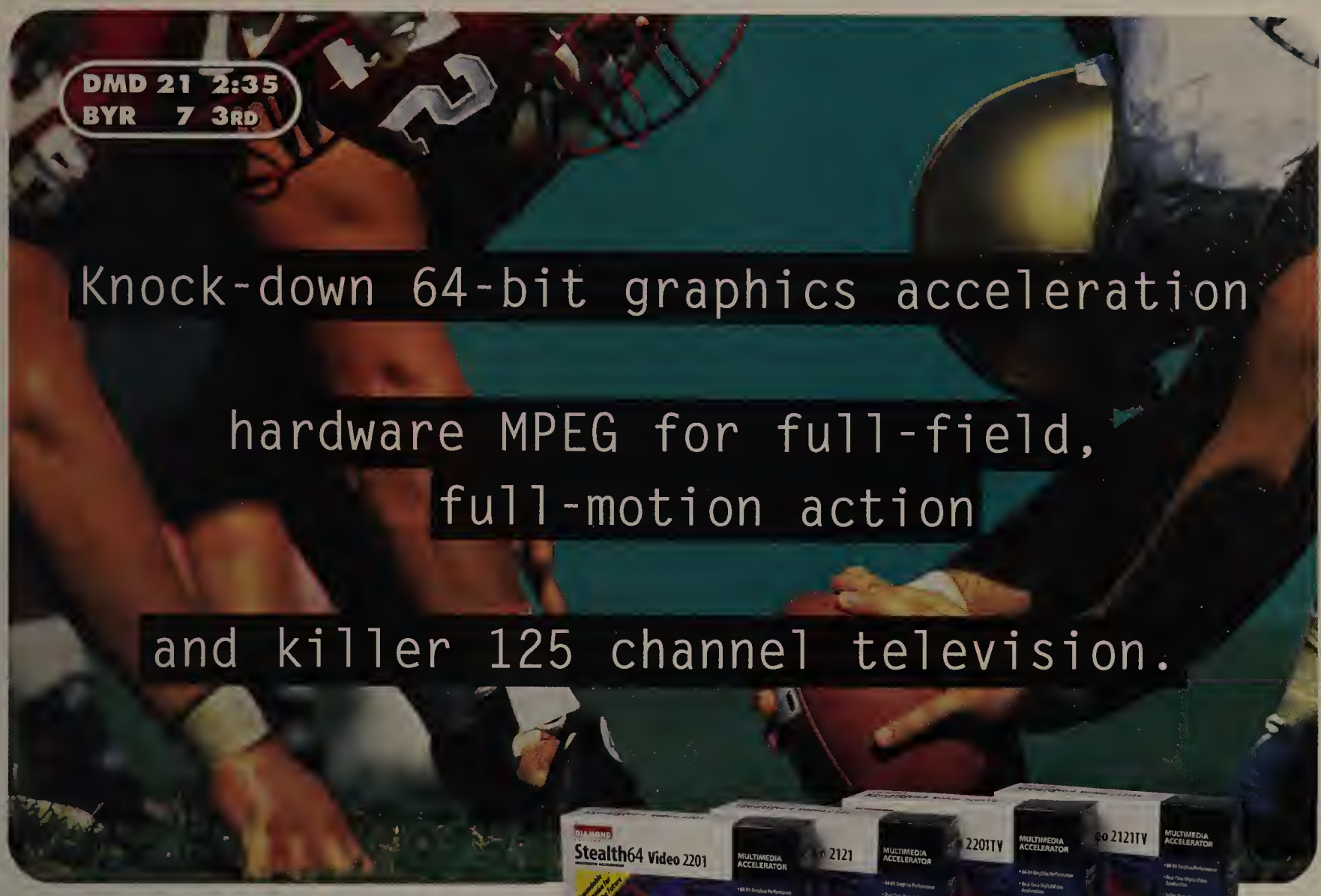

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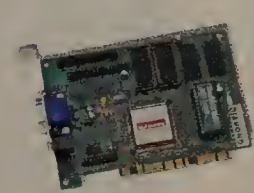
Models:	
Stealth64 Video 2121	1MB (upgradable to 2MB) DRAM
Stealth64 Video 2201	2MB DRAM
Stealth64 Video 2121TV	1MB (upgradable to 2MB) DRAM
Stealth64 Video 2201TV	2MB DRAM
Controller:	S3 Trio64V+
Vertical refresh:	Up to 120Hz
Max resolution:	1280 x 1024
Bus type	PCI
Optional hardware:	MPEG Video Player 1100 daughtercard DTV 1100 TV tuner card—2121,2201
Software	Video for Windows DCI Support Software MPEG playback for Windows® 95 and Windows® 3.1
Various software drivers and Video CODECs available	
Some models available in VLB	

"Diamond's performance may in fact justify changing your purchasing decision from 'whether Diamond?' to 'which Diamond?'"

PC MAGAZINE EDITORS' CHOICE

Stealth64 Video 2201XL
December 5, 1995



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THE TOP 20

PC WORLD

NOTEBOOK PCs

1 **Dell Latitude XPi P90T**
More affordable and loaded.

POWER SYSTEMS

		Last month	Months on chart	First reviewed	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	Dell Latitude XPi P90T	2	4	Nov 95	109	71	77/73 [3]	$4498	Pentium-90	16	810
2	Toshiba Portégé 610CT	1	3	Dec 95	108	73	82/73	$4599	Pentium-90	8	720
3	Austin Business Audio P-90	–	1	current	106	79	68/ [3]	$3008	Pentium-90	16	810
4	Dell Latitude XPi P75D	3	4	Nov 95	105	61	77/73 [3]	$3899	Pentium-75	16	810
5	Toshiba Satellite Pro 400CDT	4	2	Jan 96	103	65	82/73	$4649	Pentium-75	8	810
6	NEC Versa 2000C	5	3	Dec 95	102	46	68/71 [3]	$2799	DX4-75	8	540
7	Toshiba Satellite T2130CT	6	3	Dec 95	102	44	82/73	$3249	DX4-75	8	520
8	AST Ascentia 950N/75	7	2	Jan 96	101	63	67/68 [3]	$4049	Pentium-75	8	810
9	WinBook XP DX4-100	8	3	Dec 95	101	59	68/70	$4099	DX4-100	16	810
10	Texas Instruments TravelMate 5100	9	4	Nov 95	101	66	62/76 [3]	$5798	Pentium-90	16	1215

BUDGET SYSTEMS

1	Dell Latitude LX 4100D	1	4	Nov 95	102	50	77/72 [3]	$1999	DX4-100	8	420
2	NEC Versa 2000D	–	1	current	97	45	68/71 [3]	$1999	DX4-75	8	360
3	AMS SoundPro DX4-100	–	1	current	96	50	[3]	$2125	DX4-100	8	516
4	Dell Latitude LX 4100T	–	1	current	96	58	77/72 [3]	$2299	DX4-100	8	524
5	MidWest Micro SoundBook II	3	2	Jan 96	95	51	66/69 [3]	$2299	DX4-100	8	720
6	CTX EzBook 390T	5	2	Jan 96	93	43	[3]	$2399	DX4-100	8	420
7	WinBook XPC	8	5	Oct 95	92	30	68/70	$2499	486DX2-50	16	351
8	Sharp PC-3050	–	1	current	92	32	[3]	$2599	Cx486DX2-66	8	543
9	ACOM Patriot 4000 F	10	4	Nov 95	91	49	[3]	$2120	DX4-100	8	543
10	AMS SoundPro DX4-75	13	4	July 95	91	42	[3]	$2322	DX4-75	8	340

BEST BUY

[1] CA = color active, CD = color dual-scan, CP = color passive. [2] Call 800/434-4495 (for payment by Visa or MasterCard) or 900/903-2972 (for telephone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews ($4.95), a single capsule review plus features table and test report ($4.95), an entire month's review ($9.95), and a list of all systems tested by the PC World Test Center ($4.95). In addition, you can order next month's Top 20 charts and capsule reviews in advance (The Top 20 Flash Report, $9.95; available January 29). Touch-tone phone required.

Toshiba Portégé 610CT
Big power in a small package.

Dell Latitude LX 4100D
Excellent price, battery, speed.

NEC Versa 2000D
Newcomer starts near the top.

Weight (pounds)	Battery life (hours)	Screen type/ size [1]	Vendor contact number	Fax reprint number [2]	Reader service no.	Comments
7.2	6:38	CA/10.3"	800/613-3355	3712	728	$901 price drop moves fast P-90 with plenty of RAM and storage to number one.
6.4	5:25	CA/9.5"	800/457-7772	3721	729	$50 price drop, fast, full-size features, long battery life, good company reliability rating.
8.2	4:33	CA/10.3"	800/483-9938	3733	730	Fastest notebook on chart has great price but only fair battery life.
7.2	6:18	CD/10.4"	800/613-3355	3713	731	Not as fast as the P-90s, but still quick and well-priced for a P-75. Fine battery life.
9	4:46	CA/10.4"	800/457-7772	3728	732	Only multimedia notebook on chart is fast, has 2X CD-ROM drive.
7.8	6:28	CA/9.5"	800/632-4636	3722	733	Least expensive power notebook, good speed, long battery life.
7.4	5:40	CA/10.4"	800/457-7772	3723	734	$50 price drop, roomy keyboard, internal power supply, excellent company reliability rating.
7.2	4:44	CA/10.3"	800/876-4278	3729	735	Fine screen, good performance, and long warranty.
7.6	4:01	CA/10.3"	800/468-2162	3724	736	$60 price drop on fastest DX4-100 we've tested, robust, choice of pointing devices.
7.6	6:09	CA/10.4"	800/848-3927	3714	737	$100 price drop but still expensive, huge hard drive, lots of RAM, long battery life.
7.4	5:48	CD/10.4"	800/613-3355	3716	738	$630 price drop, long battery life, fine company reliability and service ratings.
7.2	4:08	CD/10.4"	800/632-4636	3734	739	Attractive price, but small hard drive, and battery life could be better.
8.2	4:46	CA/10"	800/886-2671	3735	740	Lowest-priced active-color note on chart has good DX4-100 performance.
7.4	2:38	CA/10.4"	800/613-3355	3736	741	Fine price, service and reliability ratings, performance, active color; poor battery life.
7	2:56	CD/10.3"	800/871-9128	3730	742	Inexpensive, large hard drive, but short battery life.
6.8	4:48	CA/10.4"	800/888-9052	3731	743	Lightweight, low-cost, long-lasting, features active color display.
7.2	4:34	CD/10.3"	800/468-2162	3711	744	Budget offering is slowest Top 20 note; lots of RAM but very small hard drive.
7.4	6:36	CD/10.3"	800/237-4277	3737	745	Slow performance, but fine battery life, large hard drive on replacement for the PC-3010.
7.8	3:12	CP/10.2"	800/898-2665	3719	746	ACOM's DX4-100 performs reasonably well, but battery life is short.
8.4	4:06	CA/9.4"	800/886-2671	3707	747	Heavy DX4-75 with sound and active-matrix color is boosted by $149 price drop.

[3] We received fewer than 100 Reliability and Service Monitor responses for this company. Its ratings here are based on a combination of responses for it and for all companies for which we received 20 to 99 responses. (If we received fewer than 20 reliability or 20 service responses for a company, no score appears.)

For more information about all products in this table, circle reader service no. 909.

Top 20 Notebook PCs

WITH A PRICE DROP OF OVER $900 (TO $4498), the Dell Latitude XPi P90T switches places with last month's number one power notebook, Toshiba's $4599 Portégé 610CT. Only one new system shows up among this month's power contenders—the Austin Business Audio P-90, the fastest notebook on our Top 20. Its $3008 price is fantastic for a system with 16MB of RAM and an 810MB hard drive; only its heavy weight and its 4.5-hour battery life keep it from being a Best Buy.

Among our budget notebook contenders, Dell lopped $630 off the price of its Latitude LX 4100D, making it a bargain at $1999. Its closest competitor is the new $1999 NEC Versa 2000D, which is lighter than the Dell, but not as fast. Three other new budget notebooks make the chart, including the AMS SoundPro DX4-100, the Dell Latitude LX 4100T, and the Sharp PC-3050.

Power Notebooks

Dell Latitude XPi P90T

REVIEWED: November 1995

PROS: Fast, excellent battery life, good documentation, three-year warranty

CONS: Still relatively expensive

A whopping $901 price drop to $4498 is all this fast P-90 needed to take over our top spot. At 7.2 pounds, it sports 16MB of RAM, an 810MB removable hard drive, and a 6.5-hour lithium ion battery. The bright 10.3-inch active-matrix screen displays up to 16.8 million colors, and Dell reliability and service rates very well.

Toshiba Portégé 610CT

REVIEWED: December 1995

PROS: Fast, compact design, over 5 hours of battery life, three-year warranty

CONS: Cramped keyboard

The $4599 Portégé 610CT subnotebook weighs just 6.4 pounds and delivers some of the best performance we've seen from a P-90 portable. It comes with 8MB of EDO RAM, a 720MB hard drive, 16-bit sound, and a 9.5-inch active color display. Survey respondents rate their Toshiba notes at the top in reliability and service.

Austin Business Audio P-90

NEW THIS MONTH

PROS: Very fast, low price, sharp display, solidly built

CONS: One-year warranty, uncomfortable trackball button placement

This strong value just missed a Best Buy. Running a P-90 CPU with 16MB of RAM, it's the fastest note on our Top 20, and its $3008 price is excellent. However, its overall score took a hit from its heavy 8.2-pound weight. Austin has a short one-year standard warranty, and its reliability rates as just average.

The Austin comes with a complete sound system that enables you, for instance, to add voice annotation to your apps. The package includes an internal sound card, microphone, and speaker, plus external jacks. On this well-configured notebook, you'll also find a roomy 810MB removable hard drive and a good 10.3-inch active-matrix color screen. You even get a 14.4-kbps internal fax-modem.

The Austin Business Audio P-90's trackball is small—about 0.6 inches in diameter—but the mouse buttons worked a little better than on the similar-looking AMS Sound Pro DX4/100 notebook, reviewed this month for the Budget chart.

Austin

The Austin Business Audio P-90 is ruggedly built but weighty at 8.2 pounds. The 4.5-hour life of the nickel–metal hydride battery is fair, and its power management functions are adequate. But there's no indicator of charge level except a light that warns when the battery is low. Austin's documentation for this notebook, however, is comprehensive, clear, and well organized.

Dell Latitude XPi P75D

REVIEWED: November 1995

PROS: Quick P-75 performance, over 6 hours of battery life, 16MB of RAM, 810MB hard drive, three-year warranty

CONS: Color dual-scan screen can't match active-matrix displays

Toshiba Satellite Pro 400CDT

REVIEWED: January 1996

PROS: Internal CD-ROM drive, fast P-75 performance, great reliability and service

CONS: Heavy 9-pound traveling weight, relatively high $4649 price

NEC Versa 2000C

REVIEWED: December 1995

PROS: Good DX4-75 performance, 6.5-hour battery life, internal fax-modem

CONS: No weekend technical support

Toshiba Satellite T2130CT

REVIEWED: December 1995

PROS: 5.7-hour battery life, AC adapter and sound built in, three-year warranty

CONS: Active-matrix color screen hard to view at certain angles

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Eastern Region: 201-646-0707 • Southern Region: 404-729-8909 • Western Region: 909-598-8094

* Two year warranty on CRT. † Requires a DDC compatible video card. © 1995, CTX International, Inc.
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Circle 74 on reader service card

8 AST Ascentia 950N/75

REVIEWED: January 1996

PROS: Built-in sound, good P-75 performance, 810MB hard drive, three-year warranty

CONS: Fax-back service and reliability ratings just below average

9 WinBook XP DX4-100

REVIEWED: December 1995

PROS: Fast for its CPU, 16MB of RAM, 810MB hard drive, several pointing-device options

CONS: No voice software to go with voice fax-modem, one-year warranty

10 Texas Instruments TravelMate 5100

REVIEWED: November 1995

PROS: 6.2-hour battery life, huge 1215MB hard drive, multimedia configuration

CONS: Despite $100 price drop, still very expensive at $5798

Budget Notebooks

1 Dell Latitude LX 4100D

REVIEWED: November 1995

PROS: Fast, almost 6 hours of battery life, large screen

CONS: Cramped keyboard, one-year warranty

With a huge $630 price drop, the Latitude LX 4100D easily retains its lead as the top budget notebook Best Buy. For a mere $1999, you get a quick, 7.4-pound DX4-100 with a 5.8-hour battery life. The 8MB of RAM and 420MB hard drive are typical for Budget chart systems, as is the 10.4-inch color dual-scan display. Our fax-back readers poll gives Dell high marks for reliability and service.

2 NEC Versa 2000D

NEW THIS MONTH

PROS: Low price, clear dual-scan display, removable hard drive, thorough documentation

CONS: One-year warranty

Our new number two Budget Notebook Best Buy, the NEC Versa 2000D, offers solid midrange performance, good video and battery life, and a stylish design—all for an economical $1999. But you may want to shell out a little more for a less-cramped hard drive.

NEC Versa

The Versa 2000D has the same DX4-75 CPU and 8MB of RAM as its sibling on the Power chart, the Versa 2000C (which costs $800 more for an active-matrix display and a larger hard drive), and it finished our test suite just a hair behind the 2000C. The Versa 2000D comes with a 10.4-inch dual-scan color screen that provides a clear, well-drawn image and a wide contrast range. The keyboard has a soft but firm click. A VersaGlide touchpad pointer sits in front of the spacebar; though preferences here are subjective, we found it comfortable.

This Versa's 360MB removable hard drive is small—Windows 95 applications will fill it up quickly. Unlike its Power sibling, the 2000D has no built-in modem. Its lithium ion battery life is much shorter as well, but still acceptable, at a little over 4 hours.

NEC's paper manuals cover just the basics for setting up and running the machine, but look a little farther and you'll find that more advanced topics are covered in the very thorough on-screen Windows documentation. Toll-free telephone technical support is available around the clock. NEC's reliability and service scores are average; the only sour note we found was its meager one-year parts and labor warranty.

3 AMS SoundPro DX4-100

NEW THIS MONTH

PROS: Low price, crisp active-matrix display, three-year warranty

CONS: Few power management features, inaccurate documentation

The AMS Sound Pro DX4-100 may not turn heads, but for a low $2125 price you'll get an all-around solid system with 8MB of RAM that performed better than the average DX4-100 notebook in our tests. It has a 516MB hard drive that's big for a budget machine and a good-looking, 10-inch active-matrix display. It also has an internal sound card, microphone and speaker, and external jacks. The NiMH battery lasted a respectable 4.75 hours in our tests. Power management functions could be better, however: An LED light will flash orange when the battery's low, but, unlike many notebooks, there's no "gas gauge" to show the charge level. This unit's traveling weight is heavy, too, at 8.2 pounds.

AMS

We found a few minor design problems. The keys on the keyboard felt loose, and the trackball—about 0.6 inches in diameter—may be too small for some people to roll effectively. The mouse buttons responded poorly and felt much stiffer than usual.

Some of the manuals that come with the system should be revised, as typos and grammatical mistakes abound. Their content, written in a conversational tone, is fairly well organized and is adequate for nontechnical users—although there are gaps: The sound card manual describes the software that comes with the card, but offers no specs on the card itself. Manuals aside, AMS's service and support policies are pretty good, with a three-year warranty and phone support available on Saturdays as well as 12 hours per day on weekdays.

4 Dell Latitude LX 4100T

NEW THIS MONTH

PROS: Very fast, bright active-matrix color screen, good design

CONS: Short battery life

Dell has a knack for producing attractive notebooks with quality components, and the Latitude LX 4100T is no exception. It closely resembles its sibling and the number one Best Buy on the Budget chart, the Latitude LX 4100D. At $2299, the 4100T costs $300

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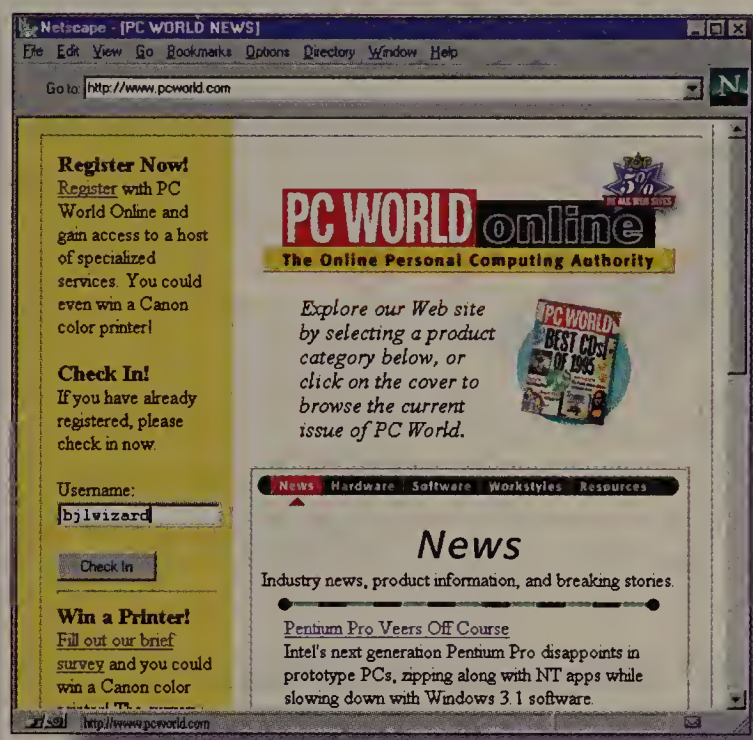

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- **NEW product-based Web site design**
- **Sizzling new Pentiums and hot competitors**
- **Special report on workgroup computing**
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- **Talk Back Live with a PC World Editor! Forum begins on Feb. 15 at 9PM (EST) on America Online**
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more—mostly for its active-matrix color display—and it has a larger, 524MB hard drive. Equipped with 8MB of RAM, the LX 4100T is also the second-fastest DX4-100 notebook we've seen. It might have placed closer to the top if not for its extremely short battery life: The nickel–metal hydride device lasted a paltry 2 hours and 38 minutes—over 3 hours less than the 4100D. You might consider buying a couple of spares ($99 each from Dell) if you don't mind adding to the 7.4-pound traveling weight (which includes one battery and the AC adapter).

Dell LX 4100T

The unit's 10.4-inch active-matrix color screen is attractive, with no discernible defects, and you get a good view from side angles.

Overall, the LX 4100T feels solid and is thoughtfully designed. The trackball is easy to use, and the keys feel firm. You also get Dell's above-average service and support. Its service and reliability ratings are among the highest around, you get a three-year warranty on parts, and phone support is available around the clock. Dell's documentation is excellent.

5 MidWest Micro SoundBook II

REVIEWED: January 1996

PROS: Low $2299 price, fine DX4-100 speed, large 720MB hard drive, sound and speakers, three-year warranty

CONS: Cramped keyboard and touchpad, short 3-hour battery life, below-average reliability

6 CTX EzBook 390T

REVIEWED: January 1996

PROS: Light 6.8-pound weight, active-matrix screen, integrated sound, 24-hour tech support

CONS: Cramped keyboard and touchpad

7 WinBook XPC

REVIEWED: October 1995

PROS: 16MB of RAM, 14.4-kbps internal fax-modem

CONS: Last 486DX2-50 is the slowest notebook on our chart, one-year warranty

8 Sharp PC-3050

NEW THIS MONTH

PROS: Longest battery life on Budget chart, configuration includes sound, bundled software

CONS: Slow, one-year warranty

With lots of features for its $2599 price, the Sharp PC-3050 enters the Budget chart in eighth place. Granted, with its Cyrix 486DX2-66 CPU and 8MB of RAM, it's one of the slowest of the Top 20 Notebooks. Many budget buyers, however, may be willing to forsake performance for a strong configuration and a 6.5-hour-plus battery life that's by far the longest on the Budget chart (it even exceeds all but one on the Power chart).

The PC-3050 comes with a big 543MB hard drive and a good-looking, 10.3-inch dual-scan color display. Sharp also includes built-in stereo speakers, an internal microphone, a 14.4-kpbs fax-modem, and an infrared port. The PC Card slot takes the standard two Type II cards or one Type III card. Sharp bundles software to complement the hardware, including the SuperVoice telephony application, Intellilink for connectivity to Sharp handheld devices, and TranX-it for infrared data transfer. You'll also find CheckFree personal finance software.

Sharp

The PC-3050's keyboard is full size and well laid out, although it seemed rather stiff to some of our reviewers, requiring very firm typing force. The touchpad, which is located below the spacebar, worked well, though a few slips of the thumb moved the cursor accidentally while we were getting used to it. The unit's 7.4-pound traveling weight is average—and bearable—for a notebook.

Aside from the one-year warranty, which is meager these days, Sharp's policies feature 24-hour phone support and a one-day turnaround on repairs.

9 Acom Patriot 4000 F

REVIEWED: November 1995

PROS: Low price for speedy DX4-100 with a 543MB hard disk

CONS: One-year warranty, sparse documentation, awkward pointing device

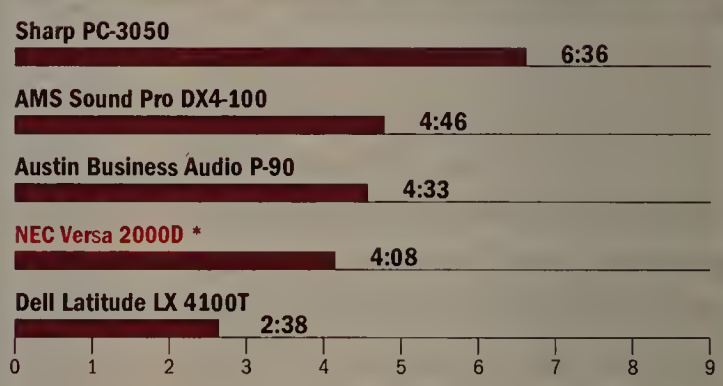
10 AMS SoundPro DX4-75

REVIEWED: July 1995

PROS: Reasonable price for a fairly quick DX4-75 with sound and active-matrix color

CONS: Heavy 8.4-pound traveling weight, small 340MB hard drive

TEST REPORT Battery Life



* Best Buy

Time in hours:minutes.

Methodology
We drain and fully recharge the battery twice and set power-saving options to match a consistent profile where possible. Office workers use Windows applications, periodically saving and allowing regular idle time. Notebooks are rotated among workers. We report the time elapsed when the notebook shuts itself off.

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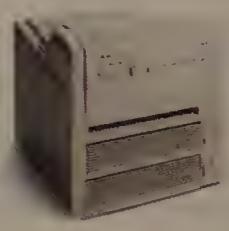

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FEATURES COMPARISON This Month's Contenders—Desktops

● = Yes ○ = No

n/a = not applicable

Standard features	HP Vectra VL 4 5/133	Maximus Magna Office	Micron P166 Millennia Plus	NEC PowerMate P-133	Polywell Poly 5150T3	Quantex QP5/100 M-3	Vektron Home Office Pro-P150
Street price as of 10/30/95 [1]	$3855	$4195	$4796	$3299	$2799	$2199	$2995
CPU	Pentium-133	Pentium-166	Pentium-166	Pentium-133	Pentium-150	Pentium-100	Pentium-150
CPU or upgrade socket	321-pin ZIF	321-pin ZIF	320-pin ZIF	321-pin ZIF	321-pin ZIF	321-pin ZIF	321-pin ZIF
BIOS	Phoenix 4.05.1	Award 8/30/95 1.0a	Phoenix 10/27/95 4.04	AMI 8/21/95	Award 8/30/95 4.50PG	AMI 10/10/94	AMI 10/10/94 1.1
Installed/maximum RAM (MB)	16/128	32/128	16/128	16/128	16/128	16/128	16/128
SIMM sockets/number free	6/4	6/2	4/2	4/2	6/4	4/2	4/2
Secondary RAM cache installed/maximum (K)	256/256	256/512	256/256	256/256	256/512	256/512	256/512
Case style	compact	tower	minitower	minitower	minitower	minitower	minitower
Free externally accessible 3½-inch/5¼-inch drive bays	0/1	1/5	0/1	0/2	1/2	0/2	1/2
Free internal 3½-inch/5¼-inch drive bays	0/0	2/0	1/0	0/0	1/0	1/0	0/0
Free 16-bit ISA/8-bit ISA expansion slots	2/0	3/0	3/0	2/0	4/0	2/0	2/0
PCI or VL bus slots/number free	2 PCI/1 [2]	4 PCI/3 [2]	4 PCI/2 [2]	4 PCI/4 [2]	4 PCI/3 [2]	3 PCI/2	4 PCI/3
Hard disk	Quantum Fireball	Quantum Fireball	Quantum Grand Prix	WD Caviar AC31600	Quantum Fireball	WD Caviar AC31000	WD Caviar AC31600
Size (MB)	1080	1080	2150	1624	1080	1083	1624
Adapter	integrated	integrated	BusLogic SCSI	integrated	integrated	integrated	integrated
Floppy drives (MB)	1.44	1.44	1.44	1.44	1.44	1.44	1.44
Graphics adapter	Matrox MGA Millennium	Number Nine Imagine 128	Diamond Stealth 64	integrated	Diamond Stealth 64	STB PowerGraph 64 Video	Matrox MGA Millennium
Installed memory (MB)/type	2/VRAM	4/VRAM	2/VRAM	2/DRAM	2/VRAM	1/DRAM	2/WRAM
Monitor	HP Ultra VGA 1280-D2817A	Maximus GD-5164	Micron 15FGx	NEC MultiSync XE15	Touch TDI 528A	MAG DX15FG	MAG DX15F
Tube/viewable diagonal (inches)	17/15.5	15/14	15/13.6	15/13.6	15/14	15/14.1	15/13.9
Dot pitch (mm)	.28	.28	.28	.28	.28	.28	.28
Modem speed for fax/data (kbps)	n/a	n/a	n/a	n/a	n/a	14.4/14.4	28.8/14.4
Sound board	Vibra 16S	SB AWE32	SB AWE32	integrated	SB CT 2800	WillowPond	SB AWE32
CD-ROM drive	Sony CDU76E	Mitsumi CRMC-FX400D	Plextor PX-63CS	NEC Multi-Spin 6x1	Matsushita CR-581-J	Toshiba XM-5302B	Teac CD-56E
Data transfer rate (K/sec)	600	600	900	900	600	600	900
Parallel/serial/mouse/SCSI ports	1/2/1/0	1/2/0/0	1/2/1/1	1/2/1/0	1/2/0/0	1/2/0/0	1/2/0/0
Service and support							
Warranty for parts/labor (years)	3/3	4/4	3/1	3/3	3/5	1/1	1
30-day money-back guarantee	●	●	●	○	●	●	●
On-site service first-year price	free	free	free	free	$75	free	$50
Repair turnaround policy (days at service center)	n/a	2	2	4	3	1	3
Daily toll-free phone support (hours)	11	10	24	24	11	12 [3]	12
Weekend support	○	●	● [4]	●	● [4]	● [4]	●
Online support sites	BBS, AOL, CIS, WWW	BBS, WWW	BBS, WWW	BBS, AOL, CIS, Prodigy, WWW	BBS, WWW	BBS, Prodigy, WWW	BBS, CIS, WWW
Automated fax support	●	○	○	●	○	●	○

BEST BUY

[1] All systems priced as configured with DOS 6.0 or later version, Windows 3.1, VGA and color monitor, keyboard, and mouse or other pointing device. Price is direct or based on a vendor estimate.

[2] One less 16-bit slot available when all PCI slots are filled, and vice versa.

[3] Nine hours on Fridays.

[4] Saturdays only.

Desktop Snapshots

These desktop systems were tested and reviewed along with the others but didn't score high enough to reach the Top 20 charts.

ALR Evolution V ST

PROS: Superb warranty, good expandability

CONS: No sound card or speakers, so-so documentation

At $3484, this Pentium-133 tower is a bit pricey. It offers 16MB of RAM, a 1083MB hard drive, a nice 15-inch MAG monitor, and an exceptional five-year parts, three-year labor warranty. Our fax-back responses indicate ALR has average reliability. But there's no sound card or speakers to complement the CD-ROM drive and no modem for the online starter kits. *ALR, 800/444-4257, 714/581-6770* **Reader service no. 754**

Blackship Centurion P-133

PROS: 6X CD-ROM drive, 28.8-kbps fax-modem, bundled titles

CONS: Slow, one-year warranty, no weekend tech support

This multimedia P-133 tower has high-quality hardware and an attractive $2995 price, but its performance is like a P-100's, even with 16MB of EDO RAM. You get a 1080MB hard drive, a 6X CD-ROM drive, and a 17-inch ADI monitor. But subpar performance, a cluttered interior, and undistinguished service and reliability dim its appeal. *Blackship Computer Systems, 800/531-7447, 408/432-7500* **Reader service no. 755**

CompuTrend Premio Triton P100

PROS: Good price and performance

CONS: Cluttered interior, no weekend tech support

This quick multimedia P-100 with 16MB of RAM, a 1080MB hard drive, and a decent graphics subsystem gets a "close, but no cigar." At $2299, it comes with a two-year warranty and would have made our Budget Desktops chart but for a snarl of cables in the compact case and no weekend tech support. *Computrend Systems, Inc., 800/677-6477, 818/333-5121* **Reader service no. 756**

Maximus Magna Media

PROS: Good P-100 performance, full features, nice price

CONS: Poor expandability, short one-year warranty

This fast multimedia tower has 16MB of RAM, a 1080MB hard drive, a 14.4-kbps fax-modem, and a 15-inch MAG monitor for only $2375. Its CD-ROM bundle includes Microsoft's Encarta. Hard-to-access drive bays and cable clutter are all that kept it off our chart. *Maximus Computers, 800/888-6294, 818/ 305-5925* **Reader service no. 757**

Midwest Micro P5-75 Home

PROS: Full multimedia, lots of software, three-year warranty

CONS: Poor reliability

At $1799, this minitower is inexpensive, but its below-average reliability holds it well short of the Top 20. It comes with 8MB of RAM, a 1080MB hard drive, a 15-inch monitor, and a 14.4-kbps fax-modem. *Midwest Micro, 800/638-7606* **Reader service no. 759**

Midwest Micro P5-133

PROS: High-end multimedia options, MS Office, Encarta

CONS: Subpar reliability rating

This $3499 minitower's so-so reliability rating keeps it off our Power chart. It's fast, with 16MB of EDO RAM on Intel's new Endeavor motherboard, built-in sound, a 1624MB hard disk, a 4MB Number Nine 9FX Motion 771 video card, a 17-inch monitor, and a three-year warranty. *Midwest Micro, 800/871-9128* **Reader service no. 760**

NEC PowerMate V100

PROS: Three-year warranty, high reliability rating

CONS: Slow for a P-100, only 1MB DRAM on graphics board

This solidly-built, expandable multimedia desktop comes with 16MB of RAM, a 1280MB hard drive, integrated sound, and a 15-inch monitor. There's 24-hour phone support, but at $2849, the Powermate V100 is pricey for a slow P-100. *NEC Technologies, Inc., 800/632-4636* **Reader service no. 761**

NMC Expert System+

PROS: Good performance at a budget price

CONS: Hard-to-access drive bays, lackluster service policies

NMC's fast Expert System+ P-133 multimedia minitower costs just $2499 and includes 16MB of EDO RAM and a 256K pipeline-burst cache. But the 850MB hard drive is relatively small, and we've seen much better monitors than the unit's 15-inch Gem CX2158DG. *National MicroComputers, 800/800-4662* **Reader service no. 762**

PDS Voyager

PROS: Great price, good performance, three-year warranty

CONS: Poor documentation

Paragon's $2995 price is good for a P-133 multimedia compact, but its 853MB hard drive and 15-inch monitor are fairly small. *Paragon Development Systems, 414/567-7770* **Reader service no. 763**

Polywell Poly 5133T3

PROS: Great warranty and system manual

CONS: A bit slow; pricey

This multimedia P-133 is too expensive for its lagging performance. For a $3560 tower, 8MB of RAM, a 1080MB hard drive, and a 15-inch monitor are underwhelming. The unit has a great two-year parts, five-year labor warranty. *Polywell Computers, Inc., 800/999-1278* **Reader service no. 764**

SmartWorks P-120

PROS: Inexpensive, two-year warranty

CONS: Very slow for a Pentium-120, undersized hard drive

This $2036 P-120 minitower is slow: With 8MB of RAM, it ran only slightly faster than many P-90s. The 853MB hard drive is small for Windows 95, and the 15-inch CTX monitor could be better. *SmartWorks, 800/441-2210* **Reader service no. 765**

Tagram Thunderbolt CT-133

PROS: Fast, lots of RAM, 6X CD-ROM drive, three-year warranty

CONS: Mediocre system manual, some cable clutter

This $3495 multimedia P-133 tower combines excellent performance with good components, just missing our Power chart. You get 32MB of EDO RAM, 512K of pipeline-burst cache, a 6X CD-ROM drive, an AWE32 sound card, and a 17-inch MAG DX 17F monitor. But the 1080MB hard drive is small for such a powerful system. Still, this is a tempting buy. *Tagram Systems, 800/824-7267* **Reader service no. 766**

Tatung Uniq 5510

PROS: Full multimedia features, 14.4-kbps fax-modem

CONS: Slow, just 1MB of graphics RAM

This $3207 P-133 compact desktop is a well-assembled power system, with 16MB of RAM, a 1083MB hard drive, and a 15-

FEATURES COMPARISON This Month's Contenders—Notebooks

● = Yes ○ = No

n/a = not applicable

Standard features	AMS SoundPro DX4-100	Austin Business Audio P-90	Dell Latitude LX 4100T	NEC Versa 2000D	Sharp PC-3050
Street price as of 10/30/95 [1]	$2125	$3008	$2299	$1999	$2599
CPU	DX4-100	Pentium-90	DX4-100	DX4-75	CxDX2-66
Traveling weight (pounds) [2]	8.2	8.2	7.4	7.2 lbs	7.4
Width x depth x height (inches)	11 x 8.4 x 2	11 x 8.5 x 2	10.4 x 8.6 x 1.8	11.8 x 9.1 x 2	11.3 x 8.8 x 2.3
Installed/maximum RAM (MB)	8/32	16/40	8/20	8/36	8/36
Secondary RAM cache installed/maximum (K)	0/0	256/256	0/0	0/0	0/0
Installed/maximum hard disk (MB)	540/ 1280	815/ 1382	524/ 810	360/ 720	540/ 540
Removable hard disk	●	●	●	●	●
Display type	color active	color active	color active	color dual-scan	color dual-scan
Viewable screen diagonal (in.)	10	10.25	10.3	10.4	10.25
Maximum colors of LCD	256	65,536	65,536	4096	256
Simultaneous LCD and external monitor	●	●	●	●	●
Highest resolution of external monitor	1280 x 1024	1024 x 768	1024 x 768	1024 x 768	1024 x 768
Mouse/keyboard ports	○/●	○/●	●/● [3]	●/● [3]	●/● [3]
Cursor keys in inverted T	●	●	●	●	●
Dedicated page-control keys	●	●	●	●	●
All 12 function keys dedicated	○	○	●	●	●
Standard <Ctrl>, <Alt> layout	●	●	○	○	○
Built-in pointing device	●	●	●	●	●
Modem kbps for fax/data	○	14.4/14.4	○	○	14.4/14.4
Docking station available	●	●	○	●	○
PC Card slots Type II/III	2/1 [5]	2/1 [5]	2/0 [5]	2/1 [5]	2/1 [5]

Power management

Type of battery	NiMH	NiMH	NiMH	lithium ion	NiMH
Suspend button	●	●	●	●	●
Suspends when case closed	○	○	○	○	●

Service and support

Warranty for parts/labor (years)	3/3	1/1	3/1	1/1	1/1
30-day money-back guarantee	●	●	●	○	●
On-site/replacement service first year price	○	●/free	free	●/free	○
Repair turnaround policy (days at service center)	3	2	○	1	1
Daily toll-free support (hours)	12	24	24	24	24
Weekend support	● [6]	●	●	●	●
Online support sites	BBS, CIS	BBS, WWW	AOL, BBS, CIS, WWW	AOL, BBS, CIS, WWW	BBS, CIS
Automated fax support	●	○	●	●	●

BEST BUY

[1] All notebooks priced as configured with DOS 6.0 or later version, Windows 3.1, color VGA display, and pointing device. Street price is direct or based on vendor estimate.

[2] Includes computer, adapter, power cord, and external floppy drive if notebook has one.

[3] Mouse port doubles as keyboard port.

[4] Port replicator available.

[5] Type III slot alternatively accepts two Type II devices.

[6] Saturdays only.

inch monitor. But it has the slowest performance we've seen from a P-133, and no on-site service is available. *Tatung Company of America, 800/827-2850* **Reader service no. 767**

Notebook Snapshots

These notebooks were tested and reviewed along with the others but didn't score high enough to reach the Top 20 charts.

5D Technology 5D-4050

PROS: Fast, high-quality 800-by-600 screen

CONS: Dismal battery life, one-year warranty

With 32MB of RAM, $4250 is a good deal for 5D's Pentium-100 notebook (an 8MB model costs $3360). It also comes with a 540MB hard drive, built-in sound, and a super-VGA color active-matrix screen. But its battery lasted only 1.8 hours. *5D Technology, 800/787-5335* **Reader service no. 768**

Acom Patriot 6000

PROS: Impressively low price, 16MB of RAM, CD-ROM drive

CONS: Unresponsive touchpad, limited support

For just $2825, this quick DX4-100 system provides lots of memory and a 543MB hard drive, plus a CD-ROM drive and sound; the NiMH battery lasts 4.5 hours. But the screen is passive-color, the touchpad is slow, and support is weak. *Acom Inc., 800/898-2665, 510/353-1600* **Reader service no. 769**

Dell Latitude XPi P120ST

PROS: 10.25-inch, 800 by 600 active-matrix color screen

CONS: Short battery life, slow for a P-120 notebook

This slim power portable, with 20MB of RAM and a 524MB hard drive, has a solid-feeling keyboard and trackball and a bearable 7.4-pound traveling weight. The large, high-resolution display overshadows those of most notes. But it's pricey at $4399, it performs slowly for its CPU class, and battery life is under 3 hours. Dell offers a three-year warranty and 24-hour support, and its service and reliability ratings remain high. *Dell Computer, 800/613-3355* **Reader service no. 770**

HP OmniBook 600CT

PROS: Excellent 9.5-inch active-matrix color screen, 6-hour battery life, featherweight 5.6 pounds

CONS: Pricey, one-year warranty, tech support is toll call

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JANUARY 1994 BYTE BEST OVERALL GENERAL BUSINESS COLOR MONITOR

For the Windows 95 environment Sceptre Technologies, manufacturer of the BYTE BEST COLOR MONITOR --- 1994, offers the WINplay Series of monitors. This new generation of displays are plug and play and DDC 1/2B with a smaller, streamlined footprint. Featuring on-screen display, 32-bit technology, and unparalleled image quality, the WINplay Series is available in all the popular CRT sizes including 14, 15, 17 and 21 inch.

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Circle 184 on reader service card

This subnote's excellent design includes a 340MB PC Card Type III hard drive in its own slot and a real mouse that pops out from the right side. HP's documentation is excellent. The OmniBook 600CT's DX4-75 CPU with 24MB of RAM performed well—though a tad slower than the DX4-75 notebooks on the power chart. Less than sterling performance, along with its high $3776 price, nudged it out of contention. *Hewlett-Packard, 800/322-4722* **Reader service no. 771**

Panasonic V41 MK II

PROS: Fine performance, multimedia, 6.5-hour battery life

CONS: Expensive, very heavy

This 11.6-pound multimedia note, priced at a stiff $6799, includes a quad-speed CD-ROM drive, 16MB of RAM, a 1031MB hard drive, and a bay that accepts an MPEG video accelerator, floppy drive, or removable battery. *Panasonic Personal Computers, 800/662-3537, 201/271-3182* **Reader service no. 772**

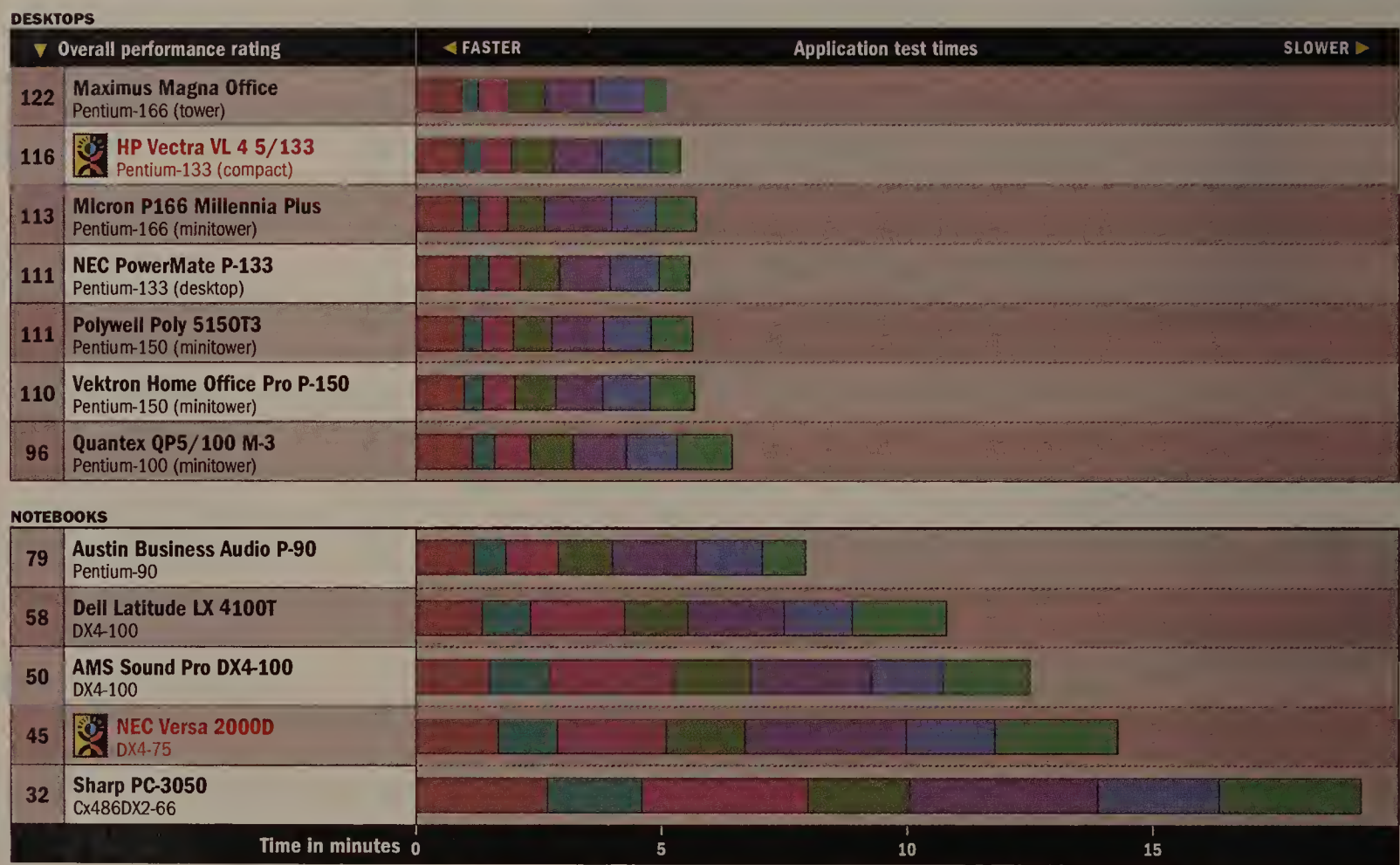
Sceptre Pentium 3000

PROS: Fastest notebook, built-in sound, three-year warranty

CONS: Short battery life, heavy

With 16MB of RAM and 256K of secondary cache, this $3995 Pentium-90 notebook set a portable speed record. The 10-inch active-matrix color screen was good, as were the keyboard and trackball. But the battery ran down in 2.3 hours. *Sceptre Technologies, 800/788-2878* **Reader service no. 773**

TEST REPORT This Month's Contenders



BEST BUY

Systems are arranged in order of overall performance from best to worst, based on the normalized, weighted scores from seven tests. A system may have a better overall performance rating than another system that took less time to complete our test suite.

Methodology

We tested each system as supplied by the manufacturer, using the version of DOS supplied. If we installed Windows, we used the default installation. We configured Windows with an HP LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. We set video resolution to 800 by 600 pixels in 256 colors using the supplied video driver where possible. We loaded the test applications and files and test automation software and scripts.

Word 2.0 for Windows

We worked with 1-, 9-, and 28-page business documents. Operations included creating, saving, opening, scrolling, editing, checking spelling, formatting, previewing, and printing.

Excel 4.0

We opened a file and performed several data extracts, entered new data, altered calculations, formatted, scrolled, moved blocks, previewed, printed, and saved.

Paradox 1.0 for Windows

We used a custom form to add a moderate number of records to an existing table, performed several queries, and generated a report.

Freelance 1.0 for Windows

We built a six-page presentation using a standard template, clip art, text, and charts; applied several views to the presentation; then previewed and saved it.

WordPerfect 6.0 for DOS

We performed a variety of editing, formatting, previewing, and printing tasks on documents ranging from a single-page memo to a long report. Due to memory requirements, the amount of free memory for DOS in the first 640K dramatically affects this test.

1-2-3 release 3.4 for DOS

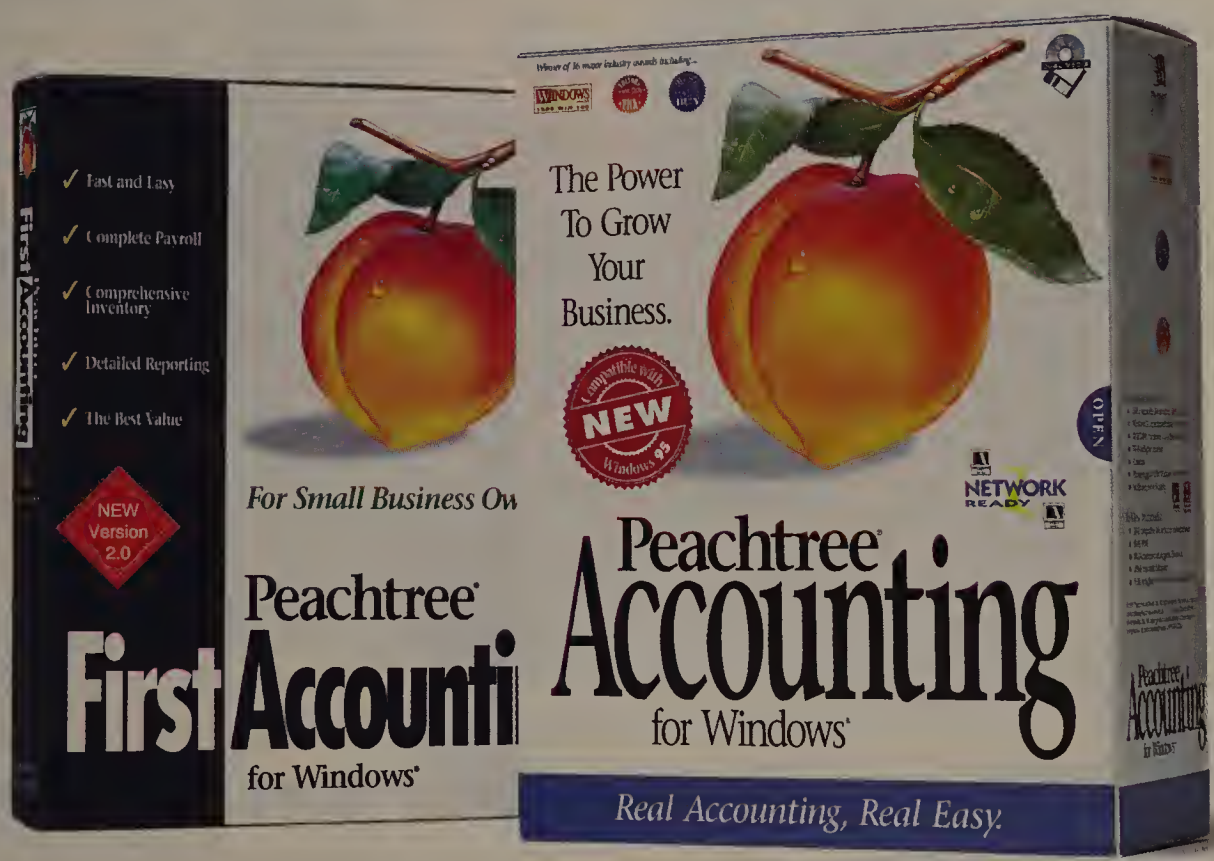
Using the graphical Wysiwyg add-in and working in three different files, we created and altered formulas, built graphs, saved, and printed.

Paradox 3.5 for DOS

We tested Paradox 3.5 running under Windows in a DOS window. We entered data, searched records, updated, and generated reports from a simple customer list.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

PLAY.



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Systems Requirements: IBM Compatible 386 or higher, Windows 3.1 running in standard or enhanced mode, 4 MB RAM, 18 MB free hard disk space, VGA or higher monitor, mouse. Works with any Windows 3.1 compatible printer. • Compatible with Windows 95. • All products are trademarks of their respective companies. • All prices listed are based on estimated street prices and do not include shipping and handling charges. • © Copyright 1996, Peachtree Software, Norcross, Georgia.

Circle 223 on reader service card

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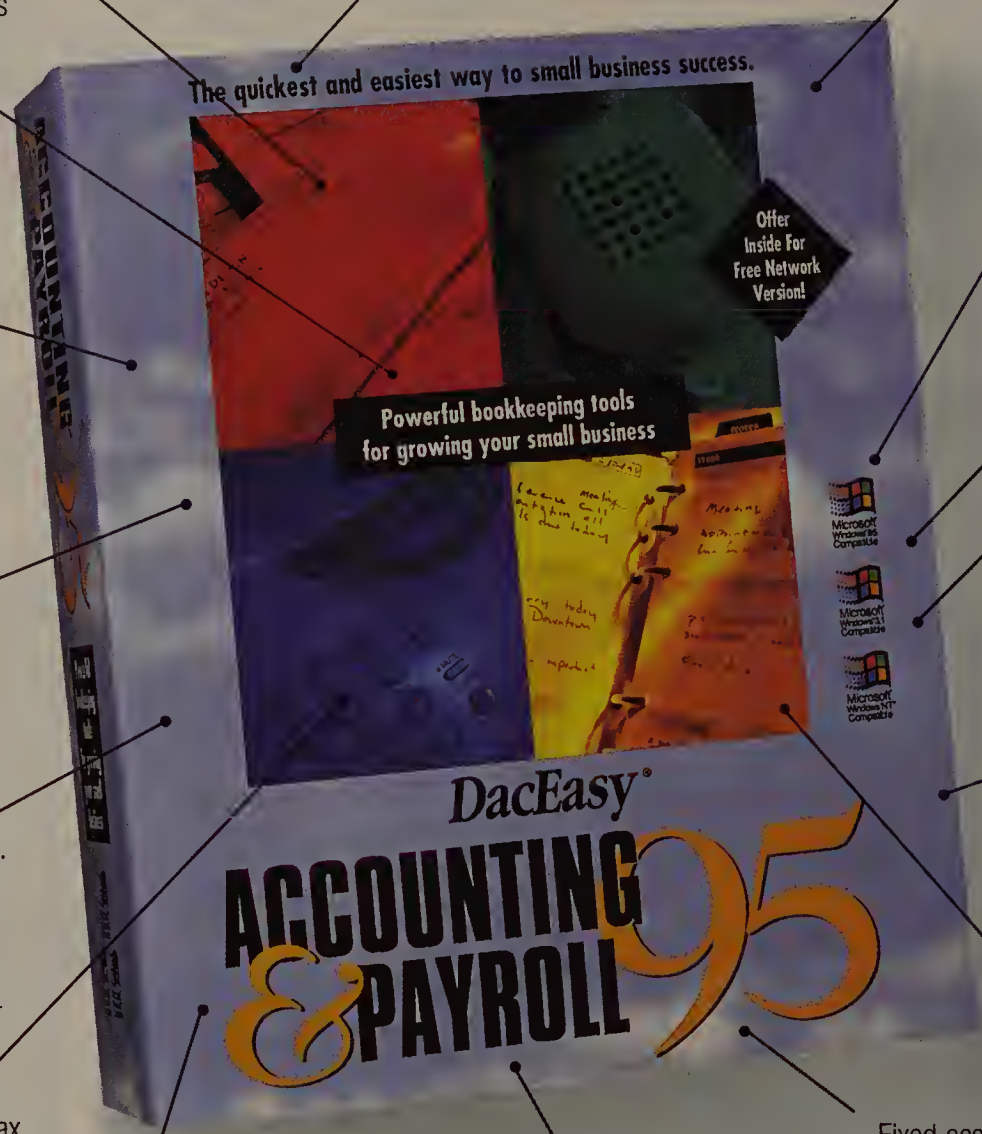

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Circle 77 on reader service card

Win an HP Vectra VL 4 5/133

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report, and even if you have responded to this survey before—and we'll enter you in a drawing to win an HP Vectra VL 4 5/133, a Best Buy Pentium-133 PC in this month's Top 20.

HOW TO ENTER: FOR BEST RESULTS, PHOTOCOPY THIS PAGE, DO NOT TEAR IT OUT. Fax your completed questionnaire to *PC World* at 415/357-4522. Do NOT fax a cover page. If you don't have a fax machine, you can mail your survey to Fax Survey, Box 2-SS, *PC World*, 501 Second St. #600, San Francisco, CA 94107-1496. Surveys must be received by February 29.

PRIZE: One entry per person. IDG employees and their families are not eligible. One prize will be awarded through a random drawing. *PC World* will make reasonable efforts to contact prize winners at the telephone and fax numbers they provide. If *PC World* is unable to do so within 30 days of the drawing, a substitute winner will be selected. No purchase necessary. Void where prohibited by law.

HOW TO FILL OUT THE FORM: Clearly print your name (use block capital letters) and your fax number at right; fill the appropriate circle for each digit of your daytime phone number. Then fill out the rest of the questionnaire. WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES!

LAST, FIRST NAME

FAX NUMBER — —

ZIP CODE

Please fill in your daytime phone number below.

1	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○
9	○	○	○	○	○	○	○	○	○	○
0	○	○	○	○	○	○	○	○	○	○

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○ Compudyne ○ Computrend ○ Comtrade ○ Cornell ○ CTX ○ Dell ○ Diamond ○ Digital (DEC) ○ DTK ○ EPS ○ Epson ○ Everex
○ Future Tech ○ Gateway 2000 ○ Hewlett-Packard ○ HiQ ○ Hyundai ○ IBM ○ Insight ○ Intelesys ○ Leading Edge ○ Micro Express ○ Micron ○ Midwest Micro
○ MIS ○ NEC ○ Netis ○ Packard Bell ○ Panasonic ○ PerComp ○ Pionex ○ Polywell ○ Quantex ○ Robotech ○ Samsung ○ Sharp
○ Swan ○ Tangent ○ Texas Instruments ○ Toshiba ○ Twinhead ○ USA Flex ○ VTech (Expotech, Laser) ○ WinBook ○ Zenith (ZDS) ○ Zenon ○ Zeos ○ Other

What size is this PC?

○ Desktop ○ Notebook/laptop ○ Handheld

What is the CPU?

○ PowerPC ○ Pentium ○ 80486 ○ 80386 ○ Other

Where did you buy this PC?

○ Local dealer ○ Mail/phone order ○ Direct from field sales force ○ Membership discount store ○ Computer superstore ○ Home electronics store ○ Retail store ○ Value-added reseller ○ Other

After ordering, how long did it take to get your PC?

○ Less than 1 week ○ 1–2 weeks ○ 3–4 weeks ○ More than 4 weeks

Who set up your PC?

○ Dealer/retailer/VAR ○ Staff computer technician ○ Self or coworker

WHEN YOU FIRST GOT YOUR PC

When did you buy this PC? (Specify month and year.)

○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 91 ○ 92 ○ 93 ○ 94 ○ 95 ○ 96

When you first set up your PC, were any components "dead on arrival" (DOA)?

○ Yes ○ No ○ Don't know

If so, which component was it? (Mark all that apply.)

○ Battery ○ CD-ROM ○ CPU ○ Floppy drive ○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory ○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse ○ Power supply ○ Sound board ○ Other

Did your problem occur only after you added your own hardware or software?

○ Yes ○ No ○ Don't know

Would you buy this brand of PC again?

○ Yes ○ No ○ Not sure

How many times have you had a problem with this PC?

○ No problem ever ○ One ○ Two ○ Three ○ Four ○ More than four

If you have had a problem that you have not reported in a previous survey, please fill out the right column. If you are reporting a DOA for the first time, skip to the service section.

NEW PROBLEM REPORT

Please answer for the most recent problem—*other than DOA*—not reported in a previous survey.

When did this problem occur? (Specify month and year.)

○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 91 ○ 92 ○ 93 ○ 94 ○ 95 ○ 96

How long was this after you purchased your PC?

○ Less than 1 month ○ 1–3 months ○ 4–6 months ○ 7–12 months ○ More than 12 months ○ Not sure

Did the problem occur as a result of adding new hardware or software?

○ Yes ○ No ○ Don't know

Did the problem occur under warranty?

○ Yes ○ No ○ Don't know

What was the problem finally identified as? (Mark all that apply.)

○ Faulty component ○ Incorrectly installed software ○ Wrong configuration ○ Faulty peripheral ○ Device conflicts ○ OS problem ○ Other ○ Don't know

If a component failed, which one was it? (Mark all that apply.)

○ Battery ○ CD-ROM ○ CPU ○ Floppy drive ○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory ○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse ○ Power supply ○ Sound board ○ Other

SERVICE

Please use this section to describe the service and support you received for the problem reported above or the DOA reported at left.

Who fixed your PC?

○ Manufacturer ○ Dealer/store where purchased ○ Manufacturer's authorized repair technician ○ Self ○ Other

What types of service and support did you receive? (Mark all that apply.)

○ Phone ○ On site ○ In store ○ System swap ○ Component swap ○ Factory return

If you received phone service, how long were you on hold?

○ Not at all ○ Less than 1 minute ○ 1–2 minutes ○ 3–5 minutes ○ 6–10 minutes ○ 11–20 minutes ○ More than 20 minutes

How long did it take before you talked to the person who finally helped you?

○ Less than 15 minutes ○ 15 minutes–1 hour ○ 2–5 hours ○ 6–10 hours ○ 11–24 hours ○ 1½–2 days ○ 3–5 days ○ 1 week or more

How long did it take to resolve the problem completely?

○ 1–2 days ○ 3–7 days ○ 8–14 days ○ 15–30 days ○ More than 1 month ○ Never resolved ○ Awaiting resolution

Was the problem resolved to your satisfaction?

○ Yes ○ No

How would you rate the person(s) who helped you?

	Poor		Good		Excellent
Courtesy	○	○	○	○	○
Knowledge	○	○	○	○	○
Follow-through	○	○	○	○	○

Based on the service and support you received, would you buy this brand of PC again?

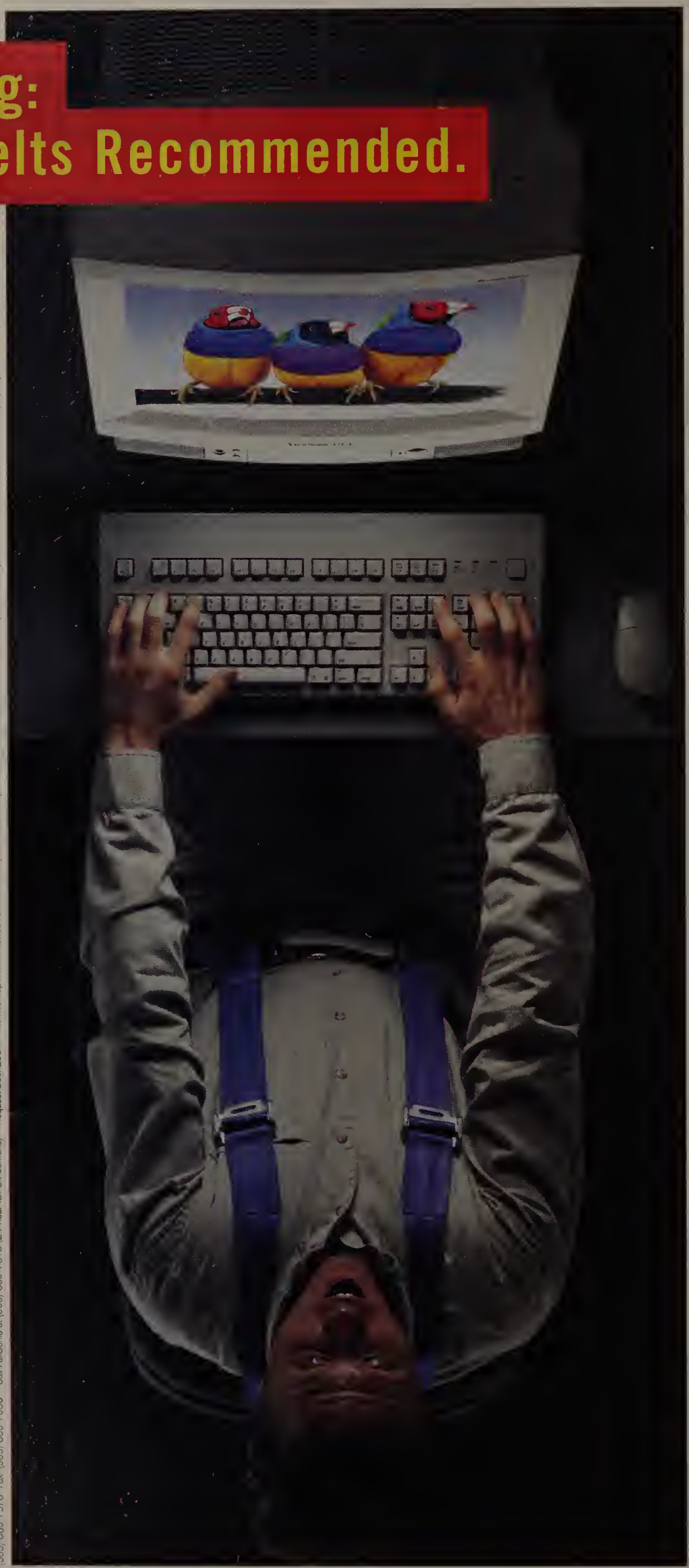
○ Yes ○ No

On the whole, how satisfied are you with the service and support you received?

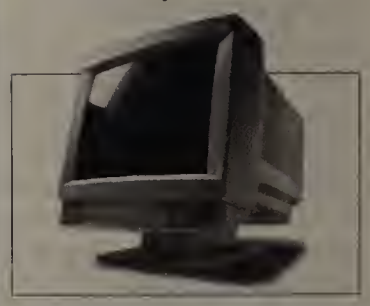
○ Not at all ○ ○ Satisfied ○ ○ Extremely satisfied

PLEASE FAX TO 415/357-4522. FOR BEST RESULTS, PHOTOCOPY THIS PAGE.

Warning: Seat Belts Recommended.



If this doesn't bring you to the edge of your seat, nothing will. It's ViewSonic's 17EA 17" (16" viewable) multimedia monitor with sharp, crisp images and built-in stereo speakers that put you right in the middle of the action.



Here's how our engineers describe it: up to 1,280 x 1,024 resolution, a 0.28 mm dot pitch and maximum refresh rate of 120 Hz.

Here's how our customers describe it: "wow-eeee."

Talk about a great picture. It's got flicker-free viewing, precisely focused screen image, sharp vivid colors and stunning audio clarity.

We've worked hard to make everything easy.

OnView™ lets you make adjustments right on the screen, no guesswork. Our exclusive ViewMatch® color control allows you to make precise color adjustments.

There's also Plug & Play + connectivity to support Windows® 95 and both PC and MAC® compatibility.*

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(909) 869-7976 Fax (909) 869-7958 • Call FaxSonic at (909) 869-7318 (24-hour fax-on-demand) • Request Doc. 203 • Internet: http://www.viewsonic.com • *Requires DDC-compatible video card. © 1996 ViewSonic Corporation. Corporate names and trademarks are the property of their respective companies.

Circle 224 on reader service card

Panasonic Puts On a Laser Show

Panasonic's New Best Buy
The speedy KX-P6500 is a 600-dpi laser that prints readable text even at 4 points, and its lines and curves are smooth. Gray-scale moves abruptly from light to dark, though.

Panasonic claims our first double Best Buy in monochrome printers this month, with both the KX-P6100 (reviewed in December) and the new KX-P6500 earning top scores. Hewlett-Packard's DeskJet 850C retains its color Best Buy honor from December. Of the three new color ink jets we review, only the Canon makes the chart.

The KX-P6100 moves from December's number two spot to become one of our two monochrome Best Buys, replacing the discontinued NEC SuperScript 610plus. For a low price of $399, the KX-P6100 prints high-quality, 300-dpi monochrome text and graphics, and the speed from its 6-pages-per-minute engine is the fastest on the chart. Its higher-end sibling, the 600-dpi KX-P6500, gives you even better output at nearly the same speed for $506, the highest price on the monochrome chart. Compared to the NEC SuperScript 660—the only other 6-ppm, 600-dpi laser on the list—the KX-P6500 has better print quality and is faster. While it's easy to set up and use these Panasonic printers, we thought the manuals had many tedious explanations and not enough diagrams.

Hewlett-Packard's new 4-ppm LaserJet 5L debuts at the number five spot, displacing the Okidata OL810e. While the OL810e was much faster and could handle more paper, the LaserJet 5L costs about $300 less for a setup that's otherwise comparable, and it comes with HP's always-excellent documentation. This printer also shares the highest output quality rating with the Panasonic KX-P6500.

The HP LaserJet 5L is one of the few personal printers to offer two output paper paths as well as two input paths (a standard slot for paper plus a manual feed slot). The separate manual feed slot lets you

TOP 10 PERSONAL PRINTERS

	Last ranking	First reviewed	Type	Street price [1]	Overall rating	Output rating: Monochrome	Output rating: Color	Speed rating: Monochrome	Speed rating: Color	Features, ease-of-use rating	Reader service number	Comments
MONOCHROME												
1 Panasonic KX-P6100 800/742-8086	2	Dec 95	laser	$399	83	65	–	58	–	65	611	Great graphics output; fast; good support.
2 Panasonic KX-P6500 800/742-8086	–	current	laser	$506	83	77	–	57	–	65	612	Fast, better output quality than its Best Buy sibling.
3 NEC SuperScript 660 800/632-4636	3	Aug 95	laser	$499	80	64	–	51	–	72	613	Good print quality, nice features.
4 Brother HL-630 800/276-7746	4	Aug 95	laser	$389	80	50	–	53	–	75	614	Fast, average text and graphics, good support.
5 HP LaserJet 5L 800/752-0900	–	current	laser	$479	79	77	–	45	–	77	615	Great output quality, but slowest on the mono chart.
COLOR												
1 HP DeskJet 850C 800/752-0900	1	Dec 95	ink jet	$529	77	50	70	29	29	77	616	Best color print quality and speed; pricey.
2 Canon BJC-70 800/848-4123	2	Aug 95	ink jet	$359	76	50	50	35	26	81	617	Adequate print quality, fast monochrome speed.
3 Digital DECcolorwriter 550ic 800/777-4343	3	Dec 95	ink jet	$329	76	42	50	33	26	68	618	Bargain price, great service and support, fast.
4 HP DeskJet 660C 800/752-0900	4	Oct 95	ink jet	$399	74	50	61	18	18	71	619	Good print quality, but slow.
5 Canon BJC-4100 800/848-4123	–	current	ink jet	$349	72	51	40	21	22	81	620	Easy to use, but not very fast.

[1] Based on vendor estimates and PC World research.

BEST BUY

Methodology To determine overall rating, we weight output quality and features (which includes hands-on testing) the most heavily, followed by price, support policies, performance, and consumables. For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

For more information about all products in this table, circle reader service no. 902.

print an envelope without removing the paper stack. The front paper exit is recommended for heavier paper stock and for reducing curl on regular paper. Curling occurs on output from all lasers; the degree varies with the kind and weight of paper used, and dry environments can heighten the effect. In our lab, using our brand of plain paper, the LaserJet 5L's paper curl was pronounced.

Color Best Buy Returns
The 600-dpi HP DeskJet 850C ink jet retains its Best Buy crown with excellent text, gray-scale, and color output even on plain paper.

Canon's New Software and Media

The new Canon BJC-4100, which replaces the BJC-4000, is the first of this vendor's revamped line of ink jets to be reviewed in the Top 10. Debuting at fifth place, the BJC-4100's text quality was good for an ink jet, but on plain paper with default settings, colors looked washed out compared to those of the Best Buy HP DeskJet 850C. The $349 BJC-4100 is also the second-slowest printer on the color chart. However, it's easy to use, with simple front panel controls, a standard 15-envelope capacity, and toll-free support that's available 18 hours a day. It can hold a black and a tricolor ink cartridge simultaneously, or an optional, high-capacity black cartridge.

If you're the home-crafts type, the BJC-4100 comes with yet another bonus: Canon Creative, a CD-ROM with software for making customizable Hallmark greeting cards, T-shirt transfers, cross-stitch patterns, and other home-oriented activities. Canon will bundle this title with all its color ink jets, along with a sample kit of the special papers and cotton cloth for use with the software. These unlikely media ran through our test printer without a hitch. But all this fun will cost you in ink usage, media, and disk space: Installing the programs on your hard drive eats about 100MB. If you run the programs off the CD-ROM instead of installing them, the player software still takes about 10MB.

The other two color ink jets we tested failed to make the chart. The 720-dpi Stylus Color IIs is a new entry-level color ink jet from Epson. With a low $349 street price, its color output is just as good as the Best Buy's, and its text output is better. But this printer is the slowest we tested, and considering its target market of novice and home users, it can be tricky to use. The internal "gas gauge" that tracks ink usage can be thrown off if you fail to precisely follow the instructions for ink tank and printhead removal, or if you turn off the printer while the Pause light is flashing. Also, the paper selection lever seemed too flimsy for a part that's used often.

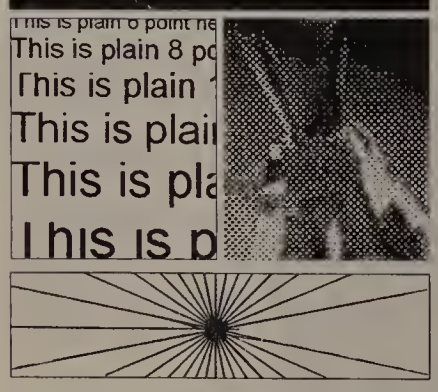
HP's new 600-dpi DeskJet 340 is a $299 portable color ink jet printer. While it has improved on the DeskJet 320 (reviewed last August) it replaces, it's still not a chart buster. It's slow, and it still has sharp-toothed feed rollers that left heavy embossed lines on the back of the plain paper we used. To its credit, it comes with both PC and Macintosh printer cables, so you can print from either kind of computer when you're on the road. And unlike most portable printers, the DeskJet 340 comes with a detachable paper feeder that holds up to 25 sheets of 20-pound paper—plenty for most print jobs.

—Bill Underwood

Bill Underwood specializes in printer design, testing, and development. Testing was performed by Ulrike Diehlmann of the PC World Test Center.

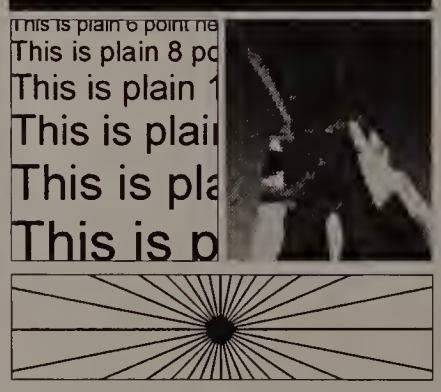
OUTPUT QUALITY SAMPLES: Two Panasonics That Print Great Text, a Color Best Buy That Can't Be Beat

Panasonic KX-P6100



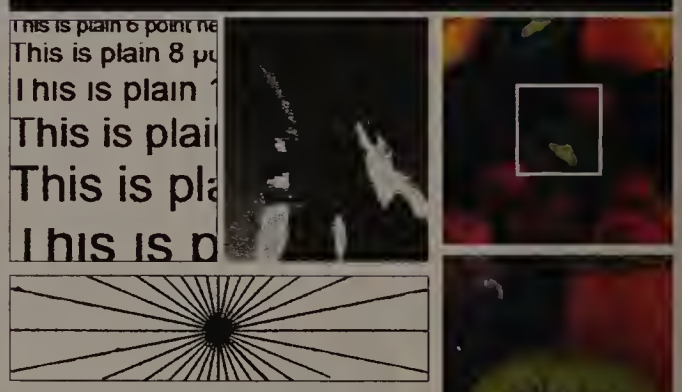
This 300-dpi printer's text is very good, with a little jaggedness evident in curves and angled lines.

Panasonic KX-P6500



This 600-dpi laser's text printing impressed us: The letters were legible even at minuscule 4-point size.

Hewlett-Packard DeskJet 850C



The DeskJet 850C prints some of the best text we've seen on an ink jet, but its color quality outshines the rest by far.

SONY

Wouldn't you rather be the master of your own destiny?

Preserve presentations. Archive data. Distribute volumes of information. Create your own CD-ROM with a click of a button. Right at your desktop. With the new Sony Spressa™ Recordable CD-ROM drive, creating CD-ROMs is easier, more reliable and more affordable than ever before.

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And, you can get started right away. From the award-winning Corel CD Creator® software to blank Spressa discs — it's all included in the box.

Why put your destiny in the hands of others when you can do it yourself at your desktop? For more information, see your retailer or call 1-800-352-7669 ext. 117 or visit us at http://www.sel.sony.com/SEL/ccpg And, become the master of your information with the Sony Spressa Recordable CD-ROM drive.

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TAKE YOUR VIDEO TO A FASTER DIMENSION.

You are about to enter a new dimension of multimedia video. A dimension where your games and movies take on a life of their own, coming to brilliant, colorful, dazzling LIFE right on the screen in front of you. If that's the video experience you want, the POWERGRAPH 64 VIDEO is the multimedia video card you need. The POWERGRAPH 64 VIDEO gives you full-screen playback of multimedia files including MPEG, Indeo, Video for Windows, Cinepak, and Video CD and CD-i to take full advantage of quad-speed CD-ROM drives. It packs up to 2MB of high-speed EDO-DRAM to kick throughput up by as much as 30 percent, with up to 16.7 million colors for true-color video playback. An astronomical 160 Hz refresh rate means you'll never see a flickering screen, and resolutions as high as 1600 x 1200 provide the ultimate in image clarity. All that power comes in a card that's Windows 95 and OS/2 Warp compatible, that's Plug-and-Play compatible for easy installation, and that's backed by a lifetime warranty from STB, one of the world's largest video card manufacturers. So move ahead into the next video dimension. Get your POWERGRAPH 64 VIDEO today.

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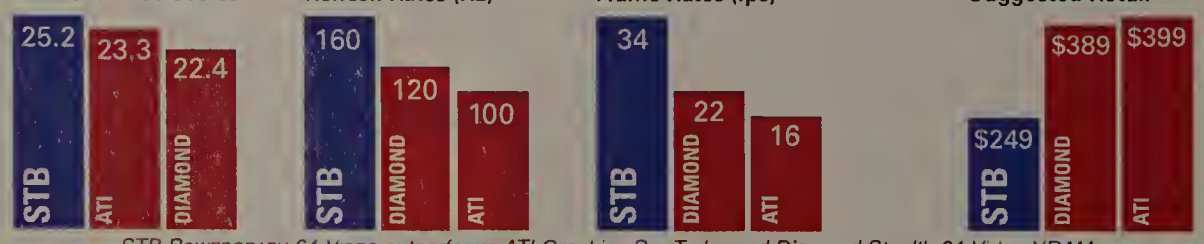
- PLUG-AND-PLAY FOR EASY INSTALLATION



STB POWERGRAPH 64 VIDEO outperforms ATI Graphics Pro Turbo and Diamond Stealth 64 Video VRAM in benchmark tests, refresh rates, and video playback.

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Copyright 1995 STB Systems, Inc. All rights reserved. All trade names referenced are the trademarks, service marks, or registered trademarks of their respective holders. For a copy of the terms of the limited lifetime warranty contact STB at (214) 234-8750. WinBench 95 1.0 and Frame Rate (fps) tests conducted on a Gateway 2000 (model P5-133XL, w/Windows 95) 133 MHz Pentium, PCI 2.0 bus, 256KB burst cache, 16MB EDO DRAM, 1.6GB Caviar IDE HD, 1024 x 768 with 256 colors at 75 Hz refresh. All boards were configured with 2MB memory. STB POWERGRAPH 64 Video, ATI Graphics Pro Turbo, and Diamond Stealth 64 Video VRAM were run using driver versions 1, 1.55, and 2.05 respectively. Frame Rate results obtained using XingMPEG Player Video Performance Diagnostics under Windows for Workgroups 3.11. Prices and specifications subject to change without notice. *Full-motion or full-screen playback frame rate is processor-dependent.

Circle 210 on reader service card

New Dell UltraScan Joins the Club

Smart Touch Simplicity *No need to hunt through on-screen menus to adjust Dell's UltraScan 15TX. Just press a button, and the menu you need appears.*

Dell is better known for its PCs than its monitors; that probably won't change. But of the five new 15-inch monitors we saw this month, only Dell's UltraScan 15TX earned a spot among the Top 10. The other monitors—the AST Vision 5L, Goldstar's 1527, Hewlett-Packard's Ultra 15, and the Vektron Link 15—all offered a good set of features, but less impressive display quality scores kept them off the chart. Meanwhile, Samtron's SC-528 UXL climbed up to seventh place, thanks to new support for Level 2b Plug and Play, while the ViewSonic 15GA, the ADI MicroScan 4V LM-1564, and the Gateway 2000 Vivitron 1572 slipped toward the bottom of the chart.

The Dell UltraScan 15TX is in sixth place. This $459 monitor is about $60 more than the standard 15LS model sold with most Dell PCs. According to Dell, the Trinitron design of the 15TX displays text and graphics better, and it supports Level 2b Plug and Play. We've seen better screens, but our judges nodded with approval after seeing readable 6-point Arial fonts in our spreadsheets, and realistic flesh tones and subtle shadow details in our test pictures. We also liked how easy it is to adjust this monitor. Simply open the control-panel cover, tap one of the buttons—such as contrast, brightness, pincushion, or image rotation—and a bar automatically appears on screen to show you the precise level of adjustment. Compared to other monitors with on-screen controls that we've tested, the Dell is less confusing in its design because you don't have to hunt through menus to find the control you want to use.

Next month we'll recap 17-inch monitors, then in April we'll be back with our 15-inch model rankings.

TOP 10 15-INCH MONITORS

	Last ranking	First reviewed	Street price	Overall rating	Text quality rating	Graphics quality rating	Features, ease-of-use rating	Dot or stripe pitch (mm)	Max. refresh rate at 800 X 600 (Hz)	Reader service number	Comments
1 **Princeton Graphics Ultra 15** 800/747-6249	1	Oct 95	$350	85	60	85	65	dot 0.28	90	621	Average text display, but top-notch graphics for a bargain price. Easy-to-use controls.
2 **NEC MultiSync XV15** 800/632-4636	2	Oct 95	$460	82	76	79	70	dot 0.28	75	622	Great text and graphics quality, Level 1 Plug and Play[1]; low refresh, but no visible flicker.
3 **ViewSonic 15G** 800/888-8583	3	Oct 95	$425	80	79	68	63	dot 0.28	90	623	Large 14-inch viewable area; great spreadsheet detail from edge to edge.
4 **Panasonic PanaSync C-1591E** 201/348-7000	4	Oct 95	$419	80	74	68	65	dot 0.27	107	624	Crisp text and good graphics, high refresh rates, easy-to-use on-screen controls.
5 **Sony Multiscan 15sf** 800/352-7669	5	Oct 95	$499	79	85	74	63	stripe 0.25	90	625	Top text rating; fine graphics; pricey; aperture grille design has faint line across screen.
6 **Dell UltraScan 15TX** 800/289-3355	—	current	$459	79	71	71	70	stripe 0.25	75	626	Very good text and graphics, Level 2b Plug and Play[1], simple controls; standard refresh.
7 **Samtron SC-528 UXL** 800/726-8766	8	Oct 95	$360	79	67	68	59	dot 0.28	75	627	Budget price, good text and graphics, Level 2b Plug and Play; standard refresh.
8 **ViewSonic 15GA** 800/888-8583	6	Oct 95	$525	79	72	62	85	dot 0.27	108	628	Expensive; speakers and mike; Level 2b Plug and Play; sharp, 14-inch viewing area.
9 **ADI MicroScan 4V LM-1564** 800/228-0530	7	Oct 95	$409	79	68	67	67	dot 0.28	90	629	High refresh rates, Level 2b Plug and Play; short two-year warranty.
10 **Gateway 2000 Vivitron 1572** 800/846-2000	9	Dec 95	$379	78	65	65	60	stripe 0.26	75	630	Easy analog controls, standard refresh; aperture grille design has faint line across screen.

[1] Plug and Play Level 1 sends monitor settings to graphics card; Level 2b adds a bidirectional capability between graphics card and monitor.

BEST BUY

Methodology We tested the monitors at a resolution of 800 by 600 dpi, color depth of 65,536 colors, and a vertical refresh rate of 72 Hz. We used a Micron P90 PCI PowerStation with 16MB of RAM and a Diamond Stealth 64 PCI graphics adapter with 2MB of DRAM. Price accounts for 30 percent of the overall rating, features and ease of use are 25 percent, text and graphics quality are 20 percent each, and service and support is 5 percent. For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

For more information about all products in this table, circle reader service no. 903.

Brawn is beautiful, not expensive

Powerful Features, Aggressively Priced

Starting with a super-sharp 17" display (15.8" viewable area), the Princeton Graphic Systems' Ultra 17+ is one powerful monitor. For added marketplace muscle, we've included all the top selling features: VESA® 1280 x 1024 @ 75Hz NI ultra high resolution, On-Screen Display, microprocessor-based digital controls, complete color/temperature correction capability, EPA Energy Star™ compatibility, and MPR II Lower Emissions Technology. Next, we made sure the $799 MSRP is well within reach of your tightest budget. And like all PGS monitors, we completely back the Ultra 17+ with our worry-free, three year warranty, plus a knowledgeable, fully trained technical support team.

PRINCETON®
GRAPHIC SYSTEMS

	PGS Ultra17+	NEC XP17	Sony 17SF	ViewSonic 17G	Nanao F2-17	Nokia 447L
Degauss	Yes	Yes	No	Yes	Yes	Yes
Trapezoidal Control	Yes	Yes	No	Yes	Yes	Yes
Tilt/Rotation Control	Yes	Yes	Yes	No	Yes	Yes
Pincushion Control	Yes	Yes	Yes	Yes	Yes	Yes
Color Balance Control	Yes	Yes	Yes	Yes	Yes	Yes
Color Temperature Control	Yes	Yes	No	Yes	Yes	Yes
BNC-5 Connectors	Yes	Yes	Yes	Yes	Yes	Yes
Microprocessor Control	Yes	Yes	Yes	Partial	Yes	Yes
On-Screen Controls	Yes	Yes	Yes	Yes	Yes	Yes
M.S.R.P./(ESP)	$799	($1,099)	$999.95	$945	($970)	$1,070

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Circle 151 on reader service card

VRAM or DRAM? The Price Gulf Narrows

A Herculean Effort
The Terminator Professional moves to number six based on its good all-around speed, dynamic software utilities, and new, lower price.

Price cuts and Plug and Play compatibility are the story in this month's Top 10. The STB Velocity 64 Video (down $20 from last month) is the first of three VRAM-based graphics boards to sport a lower price. After just missing the chart in January, the Hercules Graphite Terminator Professional jumps to number six, thanks to a $40 price drop, while the VideoLogic GrafixStar 700, now selling for $100 less than last month, reemerges at number seven after a one-month absence from the Top 10.

This month we formally factored Windows 95 Plug and Play compatibility into our ratings. With Microsoft stepping up its testing, you should see more boards certified for Plug and Play (the ATI Graphics Xpression is the most recent board on our chart to earn certification). For a graphics board, Plug and Play means you install the board, and Windows 95 sets it up to work with your system. Some of the first compatible boards use standard drivers that come with Windows 95. Contact your favorite manufacturer to see if it's released new Windows 95 drivers.

Neither of the two new boards we tested this month—Integrated Micro Solutions' $299 TwinTurbo-128S (2MB VRAM) and $539 TwinTurbo-128P (4MB VRAM)—made the chart. Both use a 128-bit controller to process graphics data quickly. Until now, only Number Nine's Imagine128 used this technology, but the Imagine128's high price confines its use primarily to graphics professionals. While both TwinTurbo models were fast in graphics applications running at 16.8 million colors, neither could keep up with less expensive 64-bit boards when it came to business applications. Moreover, the TwinTurbo software utilities and documentation seemed rudimentary in light of what we've seen from other vendors.

TOP 10 GRAPHICS BOARDS

Last ranking		First reviewed	Street price	Overall rating	Performance ratings: Business applications	Performance ratings: Graphics applications	Max. refresh rate at 1024 x 768 (Hz)	Chip/installed RAM (MB)/type	Reader service number	Comments
1	Diamond Stealth64 Video 3200 800/468-5846	1	Sept 95	$269	84	80	85	120	S3 Vision968/ 2/VRAM	601	New Win 3.1 driver slower in business apps but strong in graphics. ✓
2	STB Powergraph 64 Video 214/234-8750	2	Jan 96	$249	82	76	78	120	S3 Trio64V+/ 2/DRAM	602	Uses EDO DRAM to deliver speed in business apps for less than VRAM.
3	Diamond Stealth64 Video 2201XL 800/468-5846	3	Nov 95	$233	81	72	85	100	S3 Trio64V+/ 2/DRAM	603	Speed in graphics apps is great for a DRAM board; VL version on the way.
4	Matrox MGA Millennium 800/361-1408	4	July 95	$329	80	72	87	120	MGA-2064W/ 2/WRAM	604	Great graphics, software bundle; 3-D acceleration, no VL version. ✓
5	STB Velocity 64 Video 214/234-8750	6	July 95	$279	80	74	81	120	S3 Vision968/ 2/VRAM	605	Better for graphics apps than no. 2 Powergraph due to high-speed VRAM.
6	Hercules Terminator Professional 800/532-0600	11	Jan 96	$295	80	78	81	120	S3 Vision968/ 2/VRAM	606	Great performance and software utilities but poor install routine.
7	VideoLogic GrafixStar 700 800/578-5644	13	Oct 95	$249	80	78	79	100	S3 Vision968/ 2/VRAM	607	Uses fast but unpopular VESA Media Channel for attaching add-in cards.
8	Diamond Stealth64 Video 2200XL 800/468-5846	7	July 95	$233	79	72	82	100	S3 Vision868/ 2/DRAM	608	Solid in graphics apps; Diamond has weekend support for all cards. ✓
9	ATI Graphics Xpression 905/882-2600 ext. 1	8	Sept 94	$174	79	65	78	75	ATI Mach64/ 2/DRAM	609	Good overall value, strong software utilities; slow in business apps. ✓
10	Number Nine 9FX Motion771 800/438-6463	9	July 95	$290	79	78	78	150	S3 Vision968/ 2/VRAM	610	Fast in business apps; high refresh rates, top-notch software utilities. ✓

Windows Integrated Test Suite was developed by Jon Peddie Associates, a PC graphics consulting firm.

✓ Windows 95–certified Plug and Play.

BEST BUY

Methodology We tested boards at 1024 by 768 resolution at 256 colors and at 800 by 600 resolution at 16.8 million colors. The business applications rating consists of WITS scores for Word 2.0 for Windows, Excel 4.0, and Freelance Graphics 2.01 running in 8-bit mode, and for Freelance running in 24-bit mode. The graphics applications rating consists of WITS scores for CorelDraw 3.0, PhotoStyler 1.1, and QuarkXPress 3.11 running in both 8-bit and 24-bit modes. The overall rating balances performance, street price, features, and support policies. For all ratings, higher is better.

For more information about all products in this table, circle reader service no. 901.

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Megahertz XJ2288 Slides Into Top Spot

Truth in Advertising *The Megahertz XJ2288, our first PC Card modem Best Buy, is as easy to install as it promises. Just insert the card and plug in the phone cord.*

They can get you onto the World Wide Web, send your faxes, collect your e-mail—and fit neatly in your wallet. They're PC Card modems, credit-card–size modems for your notebook PC, and they debut this month as part of our revamped Top 10 modem list.

PC Card modems are the ultimate in portability, and they work with nearly all notebooks. They also promise true Plug and Play installation—just slip the card into a socket on the notebook, plug in the phone line, and you're up and running. In our tests of eight 28.8-kbps V.34 PC Cards this month, we found that four of the top five modems worked beautifully. Only Microcom's Travelcard 28.8P presented installation hitches.

We tested the modems with Windows 95's Plug and Play management software. If you're running Windows 3.1, you'll need to use a utility called Card and Socket Services to give your modem Plug and Play capability; this utility is usually supplied with the notebook and occasionally comes with the modem. If you have a choice, opt for the utility that comes with the notebook. As for performance, we ran the same battery of tests on PC Cards as we did for external modems.

"Sure, they're small," you say. "But do you take a performance hit?" Surprisingly little, we found. We compared the Cardinal, Hayes, Microcom, and U.S. Robotics modems to their external counterparts, and found at worst an 8 percent performance drop. Are PC Cards more expensive? Some months ago they were, but now prices vary. While you'll pay considerably more for the Cardinal and U.S. Robotics PC Cards than for their external counterparts, the Hayes Optima PC Card sells for more than $100 less than

TOP 10 MODEMS

		Last ranking	First reviewed	Street price external/internal (ISA)	Overall rating	Throughput rating	Connect rating	Features, ease-of-use rating	Reader service number	Comments
DESKTOP MODEMS	1 U.S. Robotics Sportster V.34 Faxmodem 800/342-5877	1	Nov 95	$219 / $199	86	77	88	78	669	Top combo of performance, low price keep this tiny titan at number one for fourth straight month.
	2 MaxTech XM288E 800/936-7629	2	Nov 95	$174 / $145	85	81	73	76	670	Hard-to-beat price for a solid unit; has VoiceView voice/data switching.
	3 Microcom DeskPorte Fast V.34 800/822-8224	6	Nov 95	$391 / —	84	75	90	88	671	Pricey, but includes English-language display; now Microsoft Plug and Play certified.
	4 Practical Peripherals PC288LCD V.34 770/840-9966	3	Nov 95	$359 / —	84	85	82	81	672	Expensive, but fast and one of the easiest-to-use modems we've tested.
	5 U.S. Robotics Courier V.Everything with V.34 800/877-2677	8	Jan 96	$400 / $390	83	85	90	82	673	Superfast, full-featured 33.6-kbps modem now backed by 5-year warranty.
PC CARD MODEMS	1 Megahertz XJ2288 800/527-8677	—	current	$309	85	76	69	85	674	Comes with great documentation, built-in phone jack. Great for technophobes.
	2 Microcom Travelcard 28.8P 800/822-8224	—	current	$299	84	77	80	78	675	Top performer, with by far the most 28.8 connects and hard-to-beat price.
	3 Hayes Optima 288 V.34+FAX for PCMCIA with EZjack 404/840-9200	—	current	$299	82	79	72	76	676	Priced reasonably, a great performer, and has a pop-out phone jack.
	4 U.S. Robotics Sportster PC-Card V.34 800/342-5877	—	current	$300	80	75	77	71	677	Excellent all-around unit, only PC Card unit with status lights.
	5 Cardinal Technologies MVP288C2 800/775-0899	—	current	$299	77	69	63	71	678	Next lowest price, one of the few to offer MNP-10EC cellular error control.

BEST BUY

Methodology We tested each modem using a pair of identical units, one at each end of a simulated public-service telephone network from Telecom Analysis Systems. We tested throughput and connect rates using a variety of file types and line conditions outlined in the Telecommunications Industry Association's TSB-37A and 38 specifications. We used vendor-supplied initialization strings. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

For more information about all products in this table, circle reader service no. 906.

its tabletop sibling. (The Cardinal and Hayes external modems did not score highly enough to appear on our charts).

Megahertz's XJ2288 is our Best Buy PC Card modem this month, measuring up well in every category. It's incredibly easy to set up and use. Megahertz's three-step setup instructions sounded almost like a joke—"slide in the modem, pop out the jack, snap in the phone cord"—but really, that's all we had to do. Also, it's the only modem of the bunch that provides digital line alert as well as line protection. This means that if you accidentally plug the XJ2288 into a digital line, not only do you *not* fry your modem, but the modem and software alerts you to the problem so you're not left scratching your head wondering what happened. (Digital lines, found in many offices and some hotel rooms, often look exactly like their analog counterparts.)

Still the Best
U.S. Robotics' Sportster V.34 hangs on to its Best Buy on the external modems chart for the fourth month in a row.

The XJ2288 PC Card modem also has FlashROM upgradability and a user manual even Ma and Pa Kettle would understand—in short, it's a very friendly and flexible little modem. The XJ2288 was no slouch in our test center, either, and it's reasonably priced at $309.

TDK's DF2814 Global Class isn't the PC Card for domestic travelers on a budget, but its international features are great for globe-trotters.

The PC Card modems that didn't make the chart this month may be ideal for special needs. For example, if your business has you trotting the globe, TDK's DF2814 Global Class PC Card modem ($399) is your best bet. It has a special utility that automatically configures the modem for the country you're visiting, and it even comes with a selection of phone jack adapters. However, it's not the best deal for domestic travelers: You won't want to pay extra for the international features, and the modem's a bit difficult to install under Windows 95. Look for an upcoming review of TDK's less-expensive domestic version of this card.

Do you need to dial in to different networks? ActionTec's ComNet 28.8 ($439) includes an Ethernet LAN adapter in its modem and lets you log on to your network and use the modem at the same time. NovaLink's NovaModem 288 is the only modem we tested that supports voice, which means you can use it with the appropriate software to create a PC-based telephone answering machine. However, we couldn't get the Actiontec or the NovaLink product to install on our Windows 95 test bed.

Looking at Externals

Microcom's DeskPorte Fast V.34 (first tested in November) was one of the easiest external modems we've seen to set up and use, and it moved up the ranks this month due to its recent Microsoft Plug and Play certification.

None of the four new external models we tested this month—E-Tech Research's Bullet 100E ($349), Pearl America's 1428VQE Pearl V34 ($139), Penril Datability Networks' Alliance V34M ($425), and SIIG's Dash 28.8e ($194)—made our chart. Pearl's unit is the least expensive we've seen yet, but also one of the worst overall performers, and support policies are sparse. Though the Penril modem is replete with fancy controls and connectors, it didn't perform that well, it's pricey, and it's got a manual only a rocket scientist could love. E-Tech's Bullet is attractive and much easier to use, but it still costs a pretty penny. SIIG got the price right, but its performance, features, and service and support polices left us cold.

—Bryan Hastings

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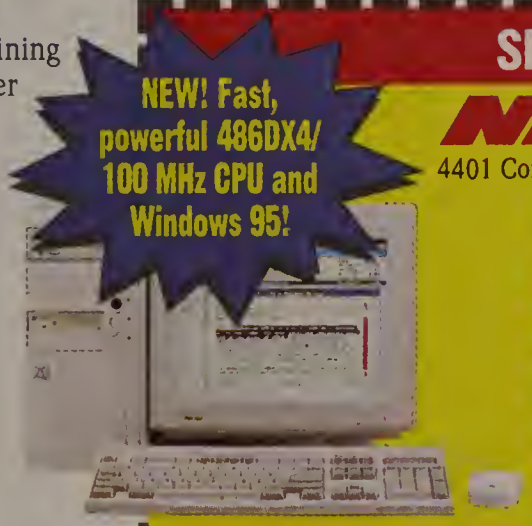

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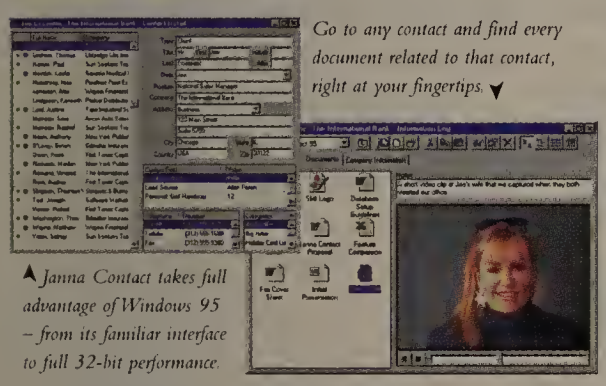

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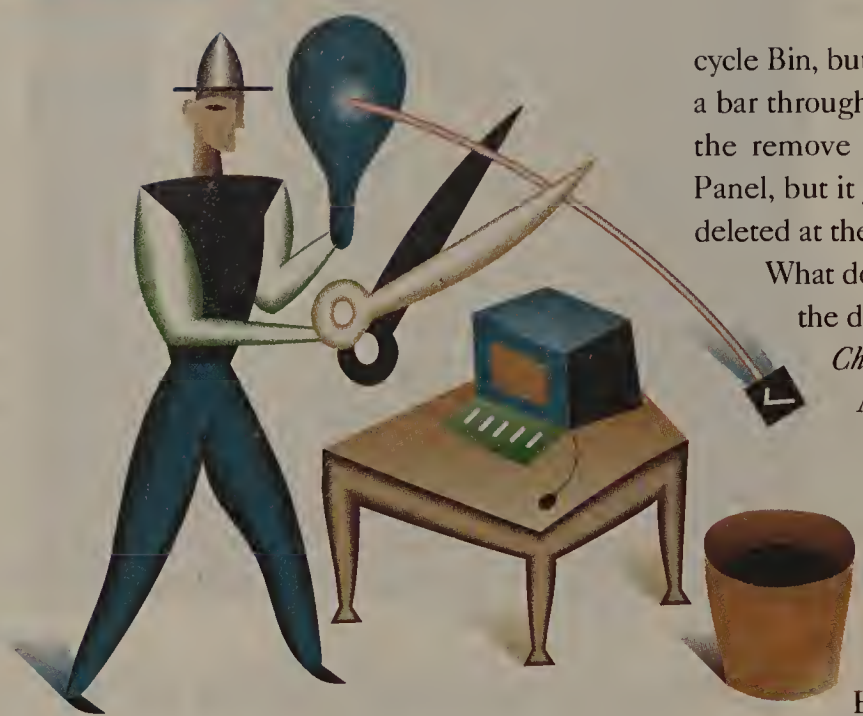
HELP LINE Q&A



Log Off Microsoft Network

Q I just installed Windows 95 and, along with it, software for accessing the Microsoft Network online service. I tried MSN, and I don't like it. Now I'd like to remove its software from my system, but I can't figure out how.

I deleted the directory manually at the DOS prompt, but the MSN icon was still there on the desktop. I tried dragging the icon to the Recycle Bin, but all I got was a circle with a bar through it. I've even tried using the remove program in the Control Panel, but it just reinstalled the files I deleted at the DOS prompt.

What do I have to do to get rid of the darn program?

Chris Wolski,
America Online

A It sounds like you got close. Any time you add or remove a part of Win 95 (such as The Microsoft Network, Exchange, or WordPad), the Add/Remove Programs applet in the Control Panel is the way to go. The trick is knowing that adding a check mark installs a listed item, and removing the check mark uninstalls it.

To remove the MSN software, open the Control Panel by selecting *Start • Settings • Control Panel*, double-click *Add/Remove Programs*, click the *Windows Set-up* tab, uncheck *The Microsoft Network* in the Components list (see **FIGURE 1**), and click *OK*. Windows 95 will ask you to insert the installation CD-ROM or floppy disk. And that's all there is to it.

The Display That Refreshes

Q I'm thinking about buying a new monitor and must choose between interlaced and noninterlaced models. I understand that interlaced displays are less expensive, but is their image quality lower too? Is interlacing related to refresh rates? And do interlaced monitors cause eye fatigue?

Elaine Miller, Park Ridge, Illinois

A Interlacing is a technique that allows some monitors and video boards to draw images more quickly at higher resolutions. The monitor's scan gun first draws every other line on the screen, then goes back and fills in the gaps on a second pass. Unfortunately, this creates noticeable flicker.

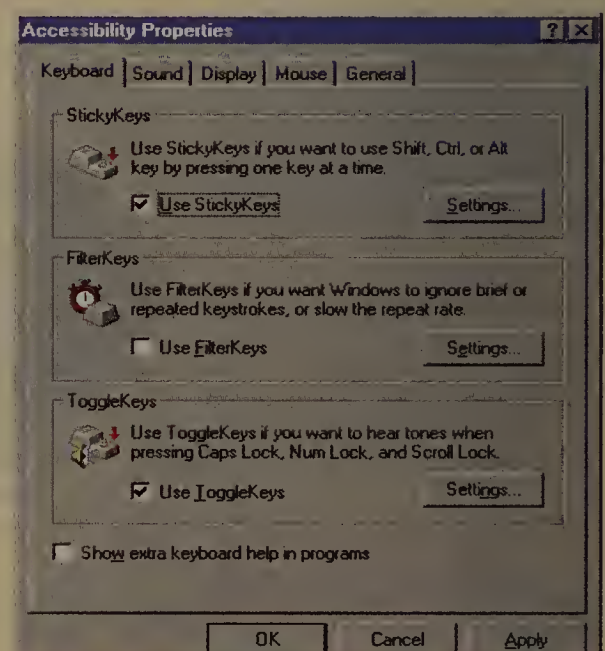
Whether the display is interlaced or not, vertical refresh rates (the speed at which the monitor draws the screen)

Need an Accessible Computer? Customize Windows 95

People with temporary or permanent physical disabilities can make computing a lot easier for themselves by double-clicking the Accessibility Options icon in the Windows 95 Control Panel. If pressing two keys at once is difficult for you, select the Use StickyKeys option on the Keyboard page. When you do, the <Ctrl>, <Alt>, or <Shift> key remains active until you press a second key. And to prevent yourself from accidentally finishing a paragraph in all caps, select the Use ToggleKeys option, which tells your system to sound a beep whenever you press <Caps Lock>, <Num Lock>, or <Scroll Lock>.

Options available on the Sound page of the dialog box are designed for the hearing impaired. You can choose to have Windows flash a part of the screen or display a caption describing what's happening every time the system makes a sound.

If, on the other hand, you have trouble seeing the screen, click the Display page of the dialog box and choose Use High Contrast or, under Settings, larger fonts or colors that are easier to see.



JAMES O'BRIEN

lower than 70 Hz can cause flicker too. In general, the higher the refresh rate, the less eyestrain. Larger displays and higher resolutions worsen the flicker.

Most manufacturers stick with noninterlaced designs these days, but you might still find a few bargain interlaced models. Resist your penny-pinching instincts, however, and pay a little extra for a noninterlaced monitor that displays the resolution you need. And remember that the monitor is only part of the ergonomic equation. Even if your monitor can handle 1024 by 768 resolution at a 75 Hz or higher vertical refresh rate, your video board may not.

Modifying Windows 95 to Run DOS Games

Q I've tried allocating more memory to my DOS games running in DOS mode by modifying the autoexec.bat and config.sys files, but nothing happens. Which files does Windows 95 use on start-up? And which files does it use when it restarts in DOS mode?
Peter Heasley,
St. Clair Shores, Michigan

A Configuring DOS mode, as distinct from simply opening a DOS window with Start•Programs•MS-DOS Prompt, is very complicated and almost entirely undocumented.

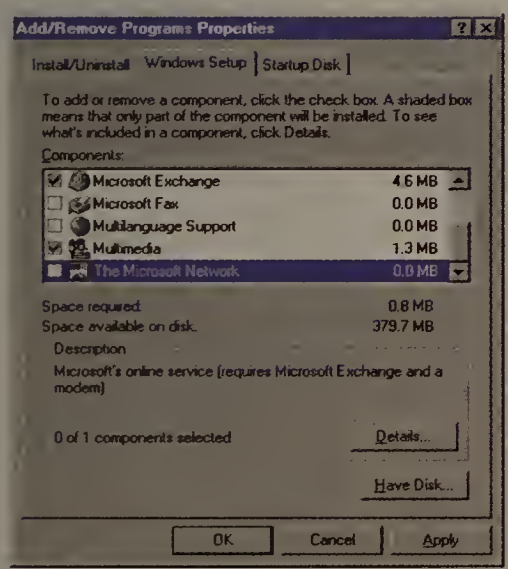


FIGURE 1: ADDING A CHECK MARK INSTALLS A LISTED ITEM, and removing the check mark uninstalls it.

First, note that Windows 95 doesn't need to load config.sys or autoexec.bat when it boots up. It automatically loads common config.sys drivers and settings such as himem.sys, emm386.exe, and files=. However, to better support your hardware and 16-bit DOS and Windows applications, Windows 95 keeps and uses your old boot files (after making a few small changes), whether or not you installed Windows 95 over your old version. It also saves your original config.sys and autoexec.bat as config.dos and autoexec.dos.

If you use Windows 95's dual-boot feature to boot to your previous version of DOS (assuming you upgraded from Windows 3.*x* and chose the dual-boot option upon installation), Windows 95 renames its customized versions of the config.sys and autoexec.bat files to config.w40 and autoexec.w40, then it restores config.dos and autoexec.dos to their original names and continues booting. Thus, if you want to change the files DOS uses to boot within a dual-boot setup, edit the files with the .dos extension if you're using Windows 95, or config.sys and autoexec.bat if you booted with the old DOS version.

DOS mode within Windows 95 is a completely separate issue. When you launch a DOS program configured to run in DOS mode, Windows 95 closes any running applications, shuts down its graphical user interface, and runs the program at the DOS prompt using your standard Windows 95 versions of config.sys and autoexec.bat, if they exist. It's similar to what would happen if you exited Windows 3.1 to run a picky DOS program, exited that program, then launched Windows again.

Actually, it's not that simple. Windows 95 shuts down its GUI as long as 'Use current MS-DOS configuration' is

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How to Add a Second Hard Disk in Windows 95

1. Turn off your computer and install the new hard disk as the second (slave) drive following the drive manufacturer's instructions.
2. Close and power up the computer. Following the drive manufacturer's instructions, enter the new drive's settings in your system's CMOS set-up program. These days, most drives autoconfigure; if the new drive does so, just set the type to Auto. While you're there, write down the settings for the current drive. Save the settings and continue.
3. Enter the command fdisk at the DOS prompt and partition the new drive. (See June and September 1995 *Help Line* for tips on partition sizing.)
4. After rebooting your system, at the DOS prompt issue the command format *d*: /s, where *d* is the drive letter of the new hard disk.
5. Locate and delete orphaned .tmp files (to find your system's temporary directory, enter set at the DOS prompt); .chk files, which usually wind up in the root directory; and anything else you don't need around.
6. Create a Windows 95 start-up disk: Select Start • Settings • Control Panel, and double-click the Add/Remove Programs icon. Click the Startup Disk page tab in the resulting dialog box, click the Create Disk button, and follow the ensuing instructions.
7. Remove the swap file: Right-click My Computer on the desktop, and select Properties from the pop-up menu. Click the Performance tab, click Virtual Memory, select Let me specify my own virtual memory settings, then select the Disable virtual memory check box. Click OK. Click Yes in the resulting warning dialog, and click OK again.
8. Restart Windows, holding down <Ctrl> as it restarts to prevent Startup group applications from loading.
9. You're finally ready to copy the contents of the existing drive to the new one: Choose Start • Run; in the Open field, enter xcopy c:*.* /e /h /k *d*: (where *d* is the drive letter of the new disk); click OK and go get a cup of coffee.
10. When xcopy is done, shut down Windows 95, power off your computer, and rejump your drives following the manufacturer's instructions for exchanging the IDE drives' master and slave roles. Turn on the system, edit the CMOS drive table settings to reflect the change, then continue booting with your startup disk.
11. Using fdisk, make partition one of disk one the active partition, then exit fdisk and reboot. Windows 95 should now boot from your new hard disk, though not without some grumbling. Some programs may complain or fail to run properly until you turn virtual memory back on (in My Computer's Properties sheet) and restart Windows.

checked in the Advanced Program Settings dialog box. To get to this dialog box, right-click your program's icon, select *Properties*, click the *Program* tab, and click *Advanced* (see **FIGURE 2**). But if you checked 'Specify a new MS-DOS configuration' in the Advanced Program Settings dialog box, Windows 95 reboots, using the custom configuration that's described in the same dialog box.

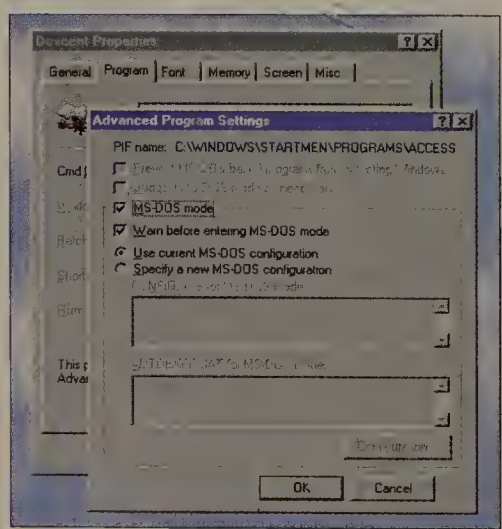

FIGURE 2: RUN YOUR RECALCITRANT DOS APPLICATIONS under Windows 95 using MS-DOS Mode.

To maximize the memory available to a DOS program running in DOS mode, try loading a memory manager (emm386.exe will do) in Windows 95's config.sys file and select *Use current MS-DOS configuration* in the Advanced Program Settings dialog box. If you'd rather not use config.sys and autoexec.bat with Windows 95, add the memory manager command line to the 'CONFIG.SYS for MS-DOS mode' window (grayed out in Figure 2). The drawback to this technique is that you must configure each DOS mode program individually and wait longer for it to launch, since Windows will reboot the system first to load the customized versions of config.sys and autoexec.bat.

Are you having fun yet?

Adding a Second Hard Disk

Last month I promised to give Windows 95–specific instructions for transferring the contents of an old IDE disk drive to a new one under DOS. While most of the steps I gave are the same under Windows 95, there are a few differences (see "How to Add a Second Hard Disk in Windows 95").

First, unlike DOS, Windows 3.*x*, and most programs that run under them, Windows 95 makes extensive use of hidden files and directories. Perhaps because of that, the 32-bit version of xcopy that comes with Windows 95 offers the /h parameter, which copies files with the hidden and system attributes set. A companion setting, /k, ensures that read-only attributes in the destination files are identical to those of the sources; omitting /k makes the destination files and directories writable.

By Scott Spanbauer

Scott Spanbauer is a contributing editor for PC World. Help Line *welcomes your questions and tips, and pays $50 for published items. See page 14 for contact information.*

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SPREADSHEETS Q&A

Easing Repetitive Data Entry in Excel

Q I need an efficient way to enter data into an Excel database. I teach photography, and I use Excel to track my students' evaluations of each other's photos. In each scoring session, they rate a series of images on a scale of 1 to 5 for composition, subject, and finish, recording their responses on a form.

I want to rapidly key in the responses the way they appear on the form and have them show up in a list, one record for each photo, then use Excel's Pivot Tables to summarize the results. The worksheet I built was too cumbersome. What's the best way to do this?
Bill Groves, Costa Mesa, California

A The best way is to store the database in one sheet, enter the data in another, and in a third sheet create a macro to transfer the entered data from the second sheet to the first. This strategy can be useful for a wide range of tasks in any spreadsheet. By separating data entry from data storage, you can organize both for maximum efficiency. And keeping the macro on its own sheet protects it from corruption.

From the sample you sent me, I constructed the model shown in **FIGURE 1**. The worksheet fragment on top shows the field labels for the database. The middle sheet is the data entry screen, with each row representing one student's scores for one photo.

To enter a student's rating of a photo, enter the session number in cell G1, place the cell pointer in column B after the student's name, and type the scores (for composition, subject, and finish), pressing <Tab> to move the cell pointer. After typing the third score, press <Ctrl>-P or click the Post button, and the macro discussed in step 7 transfers the scores from the current row of the data entry sheet to the database. Once you've posted all the data, you can summarize it with Excel's Pivot Tables.

To set up the model, follow the steps outlined here and shown in the figure.

1. On sheet 1, create the database by entering the labels shown in A1:E1 of the first screen. Double-click the sheet tab, and name the sheet **PhotoData**.

2. Create a dynamic range name to let the macro identify the next available row in the database for receiving data. Select *Insert•Name•Define*. In the 'Names in Workbook' box, enter **pd_eof**, and in the 'Refers to' box, enter the formula **=offset(photodata!A1,counta(photodata!$A:$A),0,1,1)**. This offset function is what identifies the next blank row in the database. Now click *OK*.

3. On sheet 2, create the data entry sheet by entering the labels shown in row 1 and in columns A and F of the second screen. Double-click the sheet tab, and name the sheet **PhotoEntry**.

4. Enter formulas to keep track of the number of photos that are being rated and the number of students. In cell G2, enter **=counta(photodata!A:A)−1**. In cell G3, enter **=counta(A:A)−1**. The macro uses the count of students from the formula in cell G3 to ensure that any scores accidentally entered in a row that doesn't contain a student name are not posted to the database.

5. Assign names to cells G1 and G3. Place the pointer on cell G1, select *Insert•Name•Define*, and type **pe_session** in the 'Names in Workbook' box. Assign the name **pe_students** to cell G3.

6. Now unprotect the cells in columns B through E and cell G1 so that you can enter data. Unprotecting these cells and then protecting the sheet (in step 7) lets you press <Tab> to move from cell to cell as you enter scores. (By including column E, you ensure that after you enter the Finish score, the pointer remains on the same row, so that the macro can transfer that row to the database.) Select columns B:E,

Transfer Data Between Sheets With a Simple Macro

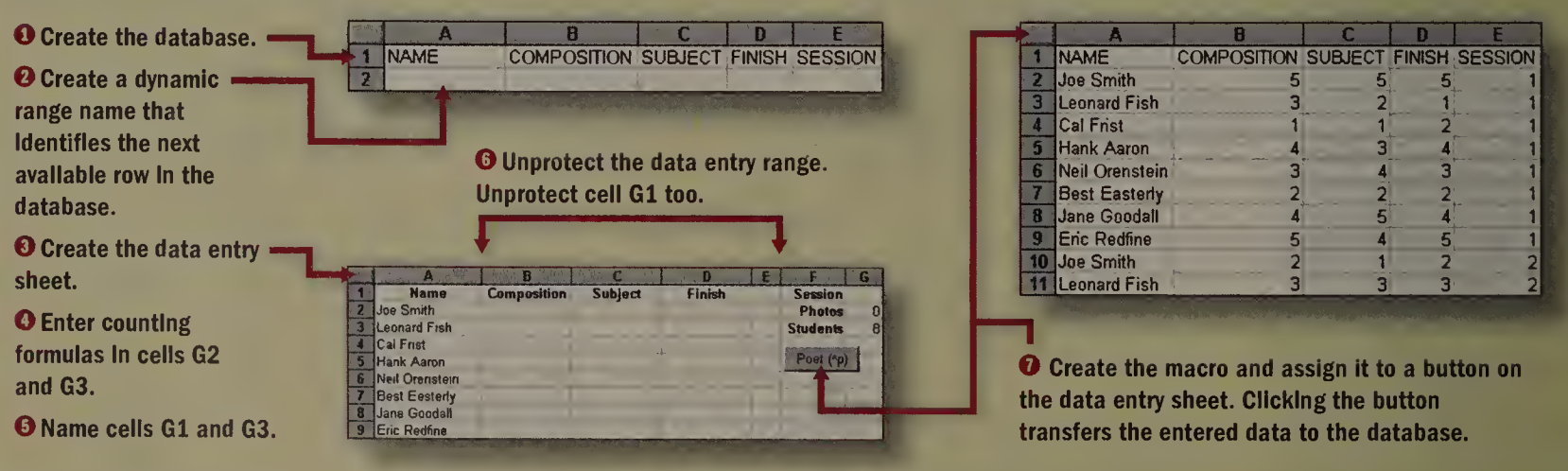
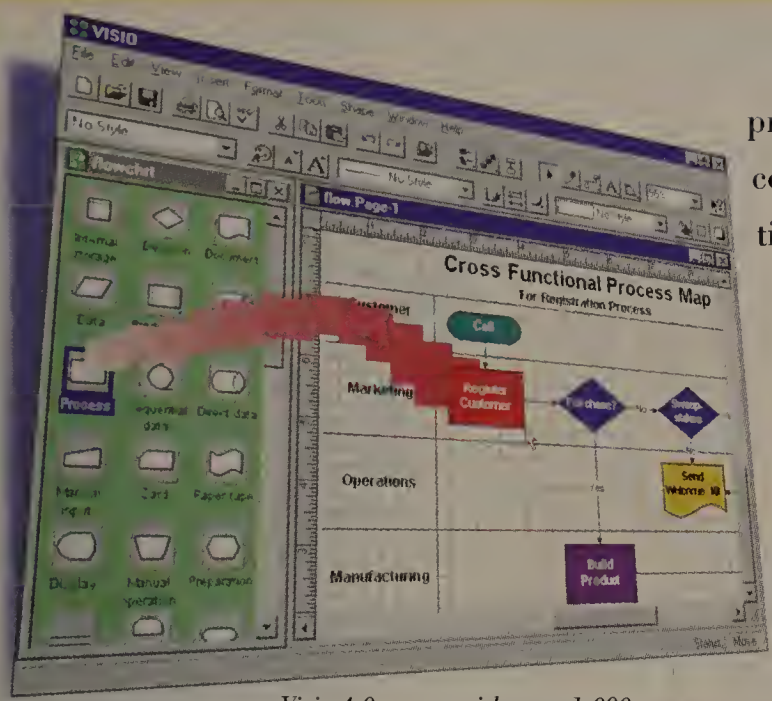


FIGURE 1: SEPARATING A DATABASE FROM DATA ENTRY is a good strategy for any spreadsheet model. A simple macro, kept on a third sheet, transfers the data entered on one sheet to the database on another sheet.



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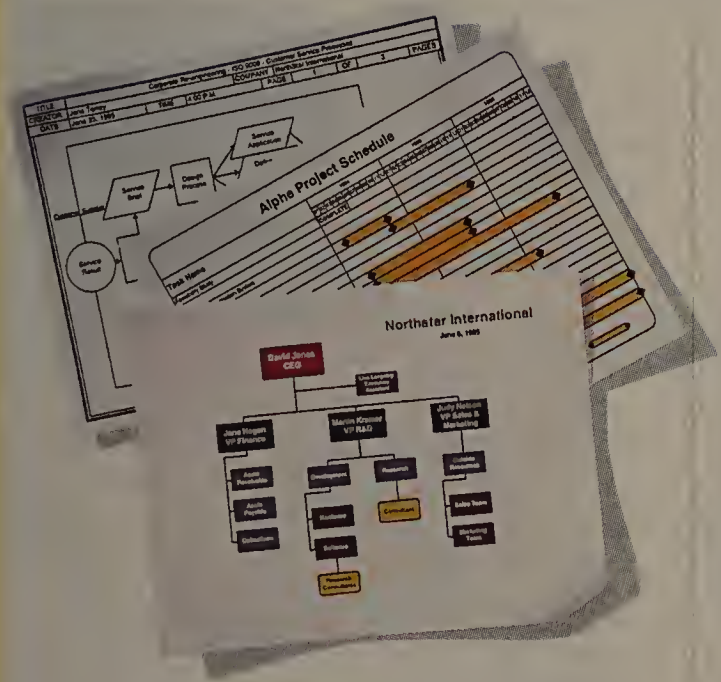

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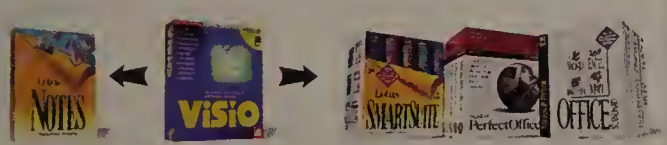

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```
Sub PostData()
    'Define range variables
    Dim CurrentStudent, CurrentScores, NewRecord As Object                    '1)
    Set CurrentStudent = Cells(ActiveCell.Row, 1)                             '2)
    Set CurrentScores = CurrentStudent.Offset(0, 1).Resize(1, 3)              '3)
    Set NewRecord = Range("pd_eof")                                           '4)

    'End macro if the cell pointer is not on a student score
    If ActiveCell.Row = 1 Then Exit Sub                                       '5)
    If ActiveCell.Row >= Range("pe_students").Value + 2 Then Exit Sub         '6)
        'Transfer data from the entry form to the list
        NewRecord = CurrentStudent.Value                                      '7)
        NewRecord.Offset(0, 1).Resize(1, 3) = CurrentScores.Value             '8)
        NewRecord.Offset(0, 4) = Range("pe_session").Value                    '9)
        'Erase data from entry form
        CurrentScores.Value = 0                                               '10)
        'Reposition the cell pointer
        CurrentScores.Cells(1, 1).Select                                      '11)
End Sub
```

choose *Format•Cells*, click the *Protection* tab in the resulting dialog box, deselect *Locked*, and then click *OK*.

7. Create the macro on sheet 3: Select *Insert•Macro•Module* and enter the statements in the figure above. Double-click the sheet tab, and rename the sheet **Macro**. Return to the PhotoEntry sheet, and click the *Button* tool to create a macro button on the sheet. Name it **Post**. Select *Tools•Protection•Protect Sheet* and click *OK*.

How does this all work? Statements 2 and 3 of the macro create range variables denoting the data to be transferred. Statement 4 creates a similar variable to mark where the data will go, based on the name pd_eof. Statements 7 and 8 perform the transfer, using the offset and resize methods to identify the cells that will receive the data. Finally, statements 10 and 11 clear the entry form and move the cell pointer into position for the next entry.

For those who'd rather not use a macro to enter data, read the next item.

Using the <Tab> Key in Excel

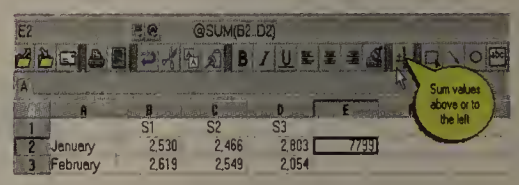
Q Excel just doesn't behave itself! I used 1-2-3 for a long time, and I like the way its <Tab> key moves the pointer one screen to the right and the way <Shift>-<Tab> moves one screen to the left. In Excel, when I press <Tab>, it moves one cell to the right. Can I make Excel's <Tab> key work like 1-2-3's? And while I'm at it, what's Excel's equivalent for 1-2-3's Range Input command, which lets you move from one unprotected cell to the next?
Dennis Behrens, Hamilton, Ohio

A To make Excel's <Tab> behave like 1-2-3's, select *Tools•Options* and click the *Transition* tab in the Options dialog box. In the Settings section, select *Transition Navigation Keys*. Now the <Tab> key (along with <Home> and <End>, label prefixes, and a variety of other gadgets) behaves as it does in 1-2-3. For a complete list of the transition effects, select *Help•Contents*. Click *Using Microsoft Excel* and *Switching from Other Applications*, then click *Switching from Lotus 1-2-3*.

As for 1-2-3's Range Input command, you can get the same effect in Excel by protecting the worksheet and pressing <Tab> (see my answer to the previous question). Start by unprotecting the data entry cells: Select a range, choose *Format•Cells*, click the *Protection* tab, deselect *Locked*, and click *OK*. To enter data, select *Tools•Protection•Protect Sheet* and click *OK*. Now, when you press <Tab>, the pointer advances from one unprotected cell to the next.

Autosumming It Up in Any Spreadsheet

Q I love the automatic sum feature in 1-2-3 for Windows. I put the pointer beside a row of numbers and click the Autosum button, and it builds a formula that sums the numbers on that row, as shown below. But when I do the same on the next cell, E3 in the figure, 1-2-3 returns @sum(E2..E2) instead of @sum(B3..D3). I made this mistake one day and my boss found it.
Alan Limmerstone, New York



A Ouch! You can avoid this problem, which is peculiar to 1-2-3, and produce a whole set of sum functions in one move in all Windows spreadsheets.

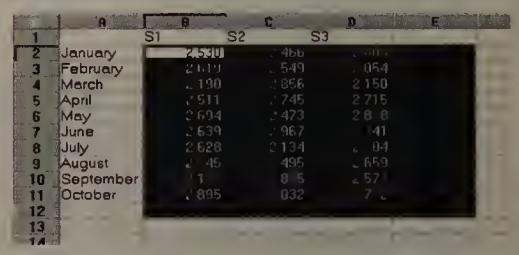


FIGURE 2: TO USE THE AUTOSUM TOOL, select not only the cells where you want the sums, but the data cells too.

Don't select just the cell where you want the sum, select the data cells, too. In the worksheet in **FIGURE 2**, say you want sums in E2..E11 and in B12..E12. Select the range shown, then click the *Autosum* tool.

The same technique works in Excel and Quattro Pro, where the Autosum tool looks a little different.

By Richard Scoville

PC WORLD online *The model in this article is available on PC World Online. Richard Scoville is a contributing editor for* PC World *and a software training consultant in Chapel Hill, North Carolina.* Spreadsheets *welcomes your questions and pays $50 for published items.* *See page 14 for contact information.*

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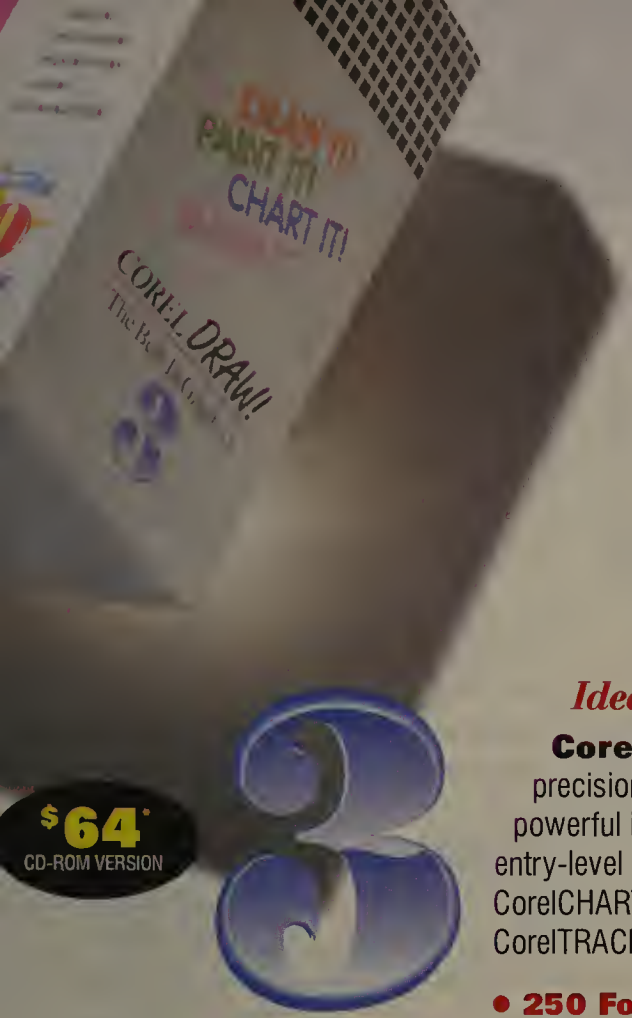

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WORD PROCESSING Q&A

View Column Layout in Word 6.0

Q I recently switched from Ami Pro to Word 6.0 for Windows. Many of the documents I create are formatted as two columns on the page. In Ami Pro, as I reached the end of one column, the text automatically jumped to the top of the second column.

In WinWord, though, the text just continues down the screen. It prints fine, but I can't see the columns while I'm typing. Is there some way that I can view the columns on the screen?

Also, does Word have a quick keystroke command that will force text into the second column?

Benny Kong, Kalamazoo, Michigan

A Word lets you view your document in two different ways as you edit: Normal and Page Layout. In the Normal view, your text will simply scroll down the screen, as you described it. Editing is somewhat faster in this view. In Page Layout view, however, you can see the columns as they will appear in print. Use Word's *View* menu to select the option you want. You can also switch between the views by clicking one of the view buttons at the bottom left of your document window. And yes, there is a keystroke command to insert a column break: Just press **<Ctrl>-<Shift>-<Enter>**.

Return Address Formatting in Ami Pro 3.x

Q I like using the automated envelope addressing feature in Ami Pro 3.0, but I can't find a way to change the font for the return address on the envelope. I'd appreciate it if you could guide me. Can you help?

Jack Dalrymple, Ann Arbor, Michigan

A My pleasure. Templates for both return and recipient addresses for Ami Pro's automated envelopes are stored in a style sheet. To change its fonts, attributes, or other formatting, perform the following steps, which are illustrated in the figure at left:

1. In Ami Pro, select *File•New*, choose the appropriate envelope style sheet, then click *OK*. (In version 3.0, the style sheet is ~amienv.sty; in version 3.1, it's _amienv.sty.)

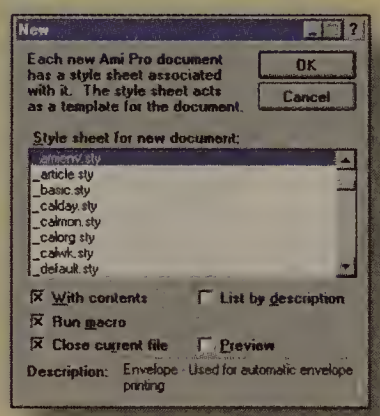
2. Select *Style•Modify Style;* choose *F4 Return* from the drop-down Style list in the Modify Style dialog box; make any changes you want in font, size, or other options; then click *Save*. While in the same dialog box, you can also change characteristics for the Recipient and Body Text styles, if you wish. When you're finished making changes, click *OK*.

3. Select *Style•Save as a Style Sheet*, then click *OK* in the resulting dialog box without making any changes. Click *Yes* when asked if you want to overwrite the existing style sheet.

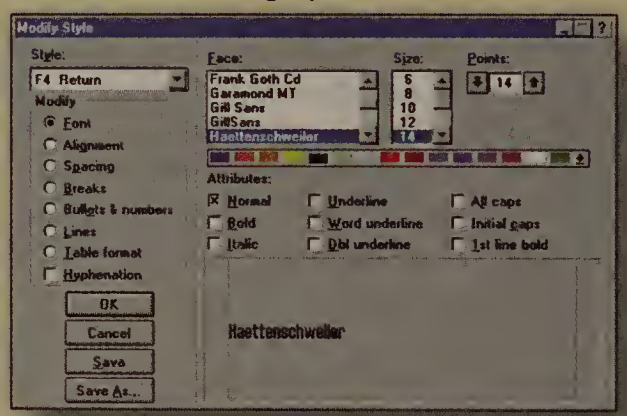
From then on, your envelopes will use the fonts you selected, rather than Ami Pro's defaults.

Address an Ami Envelope With Two Fonts

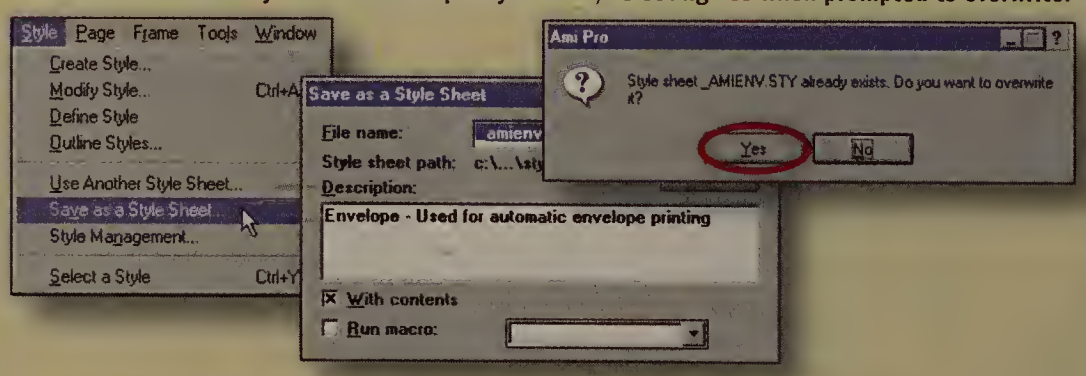
1 Open a new file and choose the envelope style sheet.



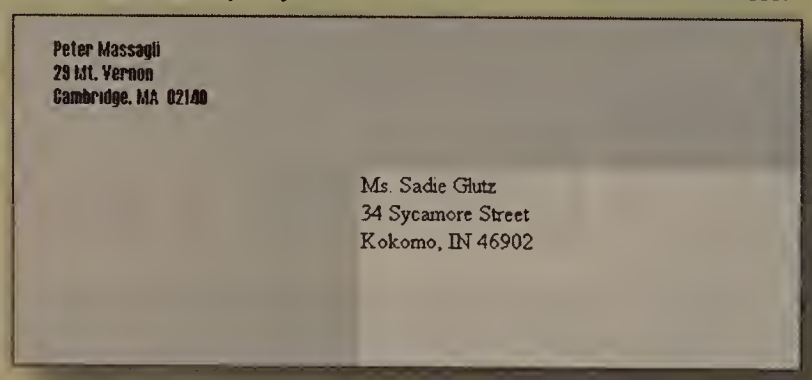
2 Choose the Return style in the Modify Style dialog box and make the changes you want.



3 Save the modified style as the envelope style sheet, selecting Yes when prompted to overwrite.



The modified envelope style with a different font for the return address.



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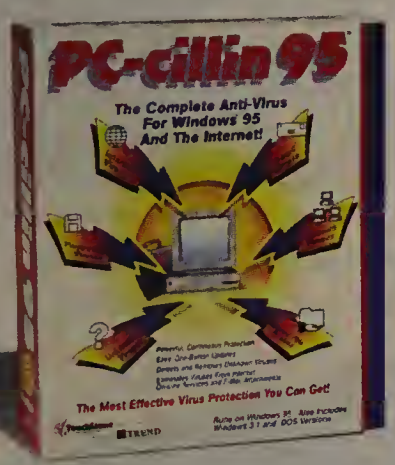

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Is Your System Protected?	*PC-cillin 95*	Norton AntiVirus for Windows 95	McAfee VirusScan 95
Automatically Adjusts Protection	**YES**	NO	NO
Checks Internet E-mail Attached Files	**YES**	NO	NO
Detects & Removes Unknown Viruses	**YES**	NO	NO
Easy, One-Button Virus Pattern Updates	**YES**	NO	NO
Monitors Shared Files	**YES**	NO	NO
Includes Windows 3.1 & DOS Versions	**YES**	NO	NO
No. of Compressed File Types Scanned	**6**	2	1

Total Protection: PC-cillin 95 also guards network connections and shared folders, detects unknown viruses, automatically executes virus scans when they are needed, cleans viruses quickly and easily – and it's so easy to use, it's like having a built-in virus expert. So remember, if your anti-virus software isn't PC-cillin 95, your system's defense is full of holes! Get the protection you need with PC-cillin 95!

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CODE PCW 296

Quick Print Previews in WinWord

Q We are finally switching from WordPerfect 5.1 for DOS to Word 6.0 for Windows. One feature I always used in WordPerfect was Print Preview, which let me see a full page at a glance so I could check its design. How do I do this in WinWord?
Pam Lyons, Kingston, Ontario, Canada

A WordPerfect's full page view command is in the Print menu; in WinWord 6.0, the Print Preview command is in the File menu. For an even faster way to get a full-page view in both WinWord and Word for Windows 95, click the *Print Preview* button on the standard toolbar. When you are ready to return to editing, click *Close* in the Print Preview toolbar.

Getting Ami Pro Documents Into WinWord

Q I have been using Ami Pro 3.0 for some time, but I recently bought Microsoft Office 4.2, which includes Word 6.0 for Windows. Unfortunately, this version of Word doesn't include an Ami Pro 3.0 conversion filter. I need to convert my old documents, but I'd hate to buy another program just to do that. Is there an easier way?
Dashan Cui, Boston

A No problem. Microsoft just released an Ami Pro 3.*x* filter for WinWord 6.0 and Word for Windows 95. You can download **amipro.exe**, an archive file that expands itself automatically if you execute it, from the **msword** forum on CompuServe, or **gc1064.exe** from Microsoft's Web site (**http://www.microsoft.com**). If you're not connected to an online service, you can order a copy on disk directly from Microsoft (800/426-9400) for the price of shipping and handling.

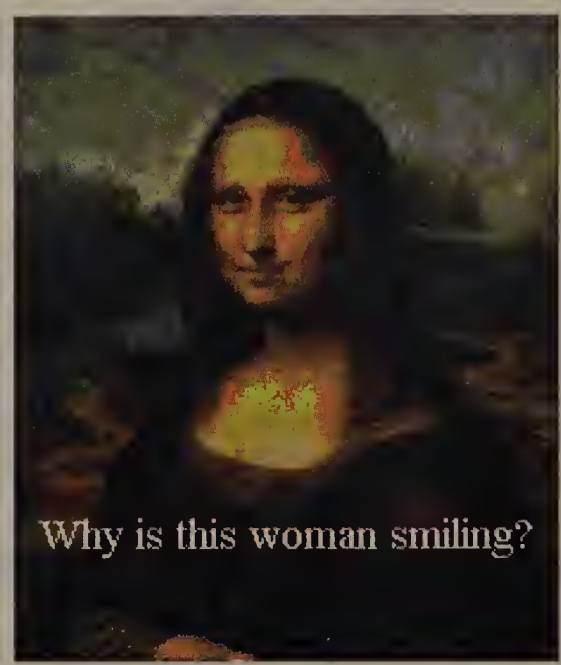

FIGURE 1: OVERLAY TEXT ON A GRAPHIC In Ami Pro by creating another frame on top of the frame that holds the graphic.

Creating Text Overlays in Ami Pro 3.x

Q I need to overlay text onto a graphic in an Ami Pro 3.1 document. I created a frame, then imported the graphic into the frame, but I can't figure out how to add the text. Can you help?
Frances Lahti, Casper, Wyoming

A It's easy to use Ami Pro to create the text overlays that you describe. After you have created the first frame and imported the graphic, select *Frame•Create Frame*, and click *Manual*.

Click and drag to create a new frame, sized to hold your text, right on top of the existing one. Now, double-click inside the new frame and type your text, format- ▶

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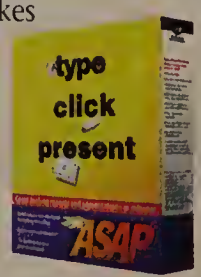

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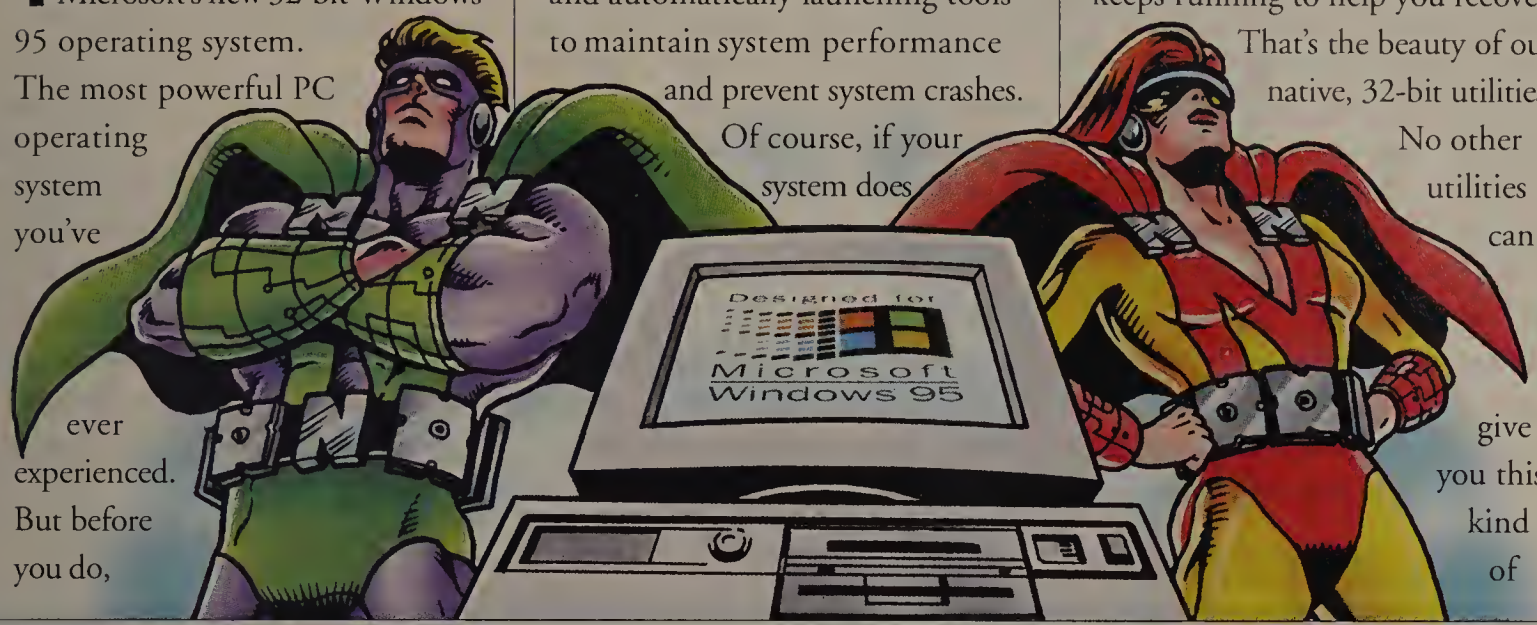

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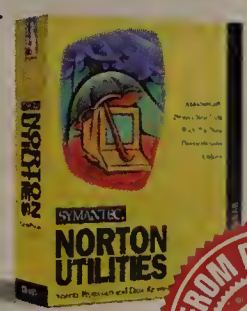

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ting it any way you like. With the text frame still selected, select *Frame•Modify Frame Layout* and click the *Transparent* option in the *Display* area of the *Modify Frame Layout* dialog box. To get rid of the lines (and the shadow, if there is one) around the frame, click *Lines & shadows* in the Frame area of the dialog box, deselect *All* in the Lines section, and click *None* in the Shadow section.

Click *OK* to return to your document, where you'll see your text overlay just as you wanted, with the background graphic showing through, as illustrated in **FIGURE 1**.

Freeze Cell Size in WordPerfect 6.0 Tables

Q In WordPerfect 6.0a for Windows, I have created several templates that include tables my coworkers enter data into. The problem is that if a user presses <Enter> after typing in data, the cell and the entire row increase in height. I know I can protect cells from being edited, but is there a way that I can prevent them from changing size?
Harvey Roth, Berlin, Maryland

A You can force WordPerfect to accept only one line of text per cell. By default, table cells increase in height when the entered text exceeds one line or when the user presses <Enter>. To change this setting in an open table, place the cursor in the row you want to alter, or select several rows by clicking and dragging with the mouse. Select *Table•Format*, click *Row* in the Format dialog box, click *Single Line* in the Lines Per Row section, then click *OK*.

You'll have to repeat this routine for each table you create, though, since WordPerfect doesn't let you set this cell formatting as the default.

Crashing Colorfully in WordPerfect for Windows

Q I recently changed my Windows video mode from 800 by 600 with 16 colors to 800 by 600 with 256 colors. After I made that adjustment, WordPerfect refused to run, giving me a General Protection Fault. All my other software runs fine. If I switch back to the 16-color mode, WordPerfect runs OK again, but I need that 256-color display to take advantage of multimedia software. Is there anything I can do?
Larry Pidor, Cebu City, Philippines

A WordPerfect 6.*x* has a problem handling screen updates with some SVGA drivers that display 256 colors or more—including yours, apparently. Fortunately, there's a fix. Exit WordPerfect, and in the Windows Program Manager, click the *WordPerfect* icon. Select *File•Properties*. In the Properties dialog box, click inside the Command Line box, press **<End>**, then type a space followed by **/fl**. Click *OK*.

This forces WordPerfect to use standard Windows screen-writing methods. You may still notice some mild flashing whenever the screen is refreshed.

By George Campbell

George Campbell is a contributing editor for PC World *and a contributor to* The PC Bible *(Peachpit Press, 1995, 800/283-9444).* Word Processing *welcomes questions and pays $50 for published items. See page 14 for information.* ■

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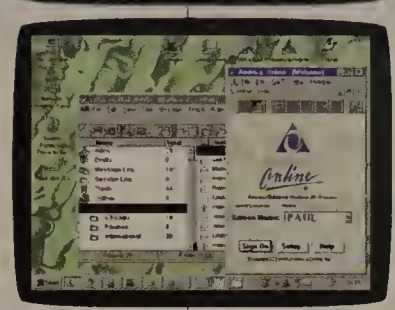

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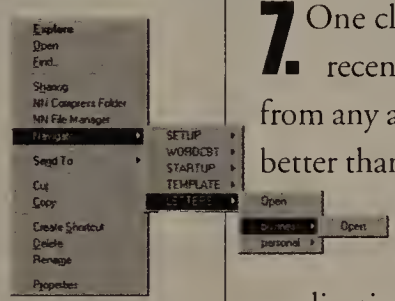
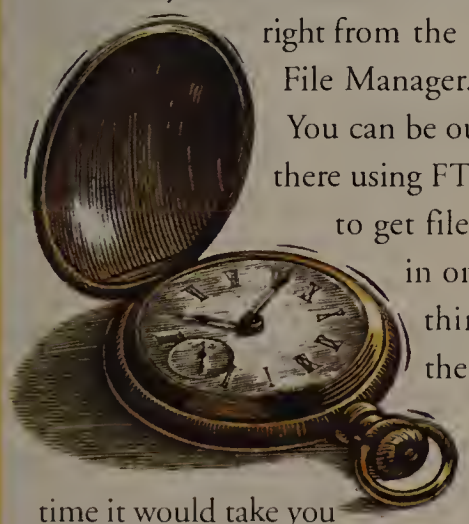
1. First, copy a file from one directory to another. Okay, now copy another file. On average, it takes about eleven steps per file. Now copy a file with Norton Navigator. Mission accomplished. One step.

2. Opening a folder in Windows 95 takes a full five clicks of your trusty mouse. But with Norton Navigator, you can open any folder with just one simple click.



3. Compress a file. Our built-in PK-Zip compatible compression saves you a minute every time.

4. Use Norton Navigator to plug into your Internet connection right from the File Manager. You can be out there using FTP to get files in one third the time it would take you with a separate application.



5. Try a word search for "profits" or any other text string within files. It's at least ten times faster on average with Norton Navigator. No matter how many files you have. Or how big they are. In fact, the bigger the files, the more time you'll save.

6. Save another minute every time you delete, move, zip, or encrypt from any application's Open or Save dialog box. (Are you keeping count?)

7. One click is all it takes to access recently opened files or folders from any application. Now isn't that better than wading through folders?

8. Launch your favorite files, folders, or applications simply by pushing a button on the Norton Taskbar. No more going up and down to and from the Start menu over and over again.

9. With Norton Navigator, you can create a different desktop for each project. So you can find your work more easily. And save even more time.

10. Windows 95 supports long file names for all of your new 32-bit applications. Norton Navigator supports long file names for most 16-bit applications, too. So you'll never again have to remember what "billgbox" means.

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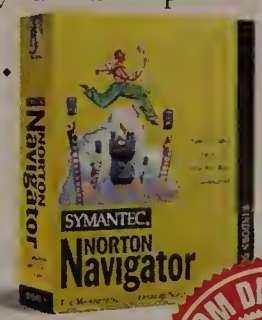

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WINDOWS Q&A

Animate Screen Savers in Windows 95

Q I have a nice little collection of Windows video (.avi) files, including the ones that came on the Windows 95 CD-ROM. Can I make one of these into a screen saver and activate it whenever I want to?
Sheila Durraut, Fort Worth, Texas

A A number of freeware and shareware programs can play .avi files as screen savers, including the one featured in this month's *Windows Toolbox*. But if you're willing to start your screen saver manually, you don't need any extra software to make an .avi file run full screen at the touch of a key.

Here's what to do: First, if the .avi file you want is on CD-ROM, copy it to your hard disk. Double-click the .avi file to start playing it. Then double-click its title bar to start the Media Player utility. Choose *Edit•Options*, check *Auto Repeat*, and click *OK*. Next, choose *Device•Properties*. Under 'Show video in', select *Full screen* and click *OK*. Then exit Media Player.

Create a shortcut for your .avi file by right-dragging it to any folder within the Start Menu folder (the easiest way to get to this folder is to right-click the *Start* button and choose *Open* or *Explore*). When you release the right mouse button, choose *Create Shortcut(s) Here*. Right-click the shortcut and choose *Properties*. Click the *Shortcut* tab, then click in the *Shortcut key* box. Press the key combination that you want to use to activate your new screen saver (it has to begin with **<Ctrl>-<Alt>**, **<Ctrl>-<Shift>**, **<Shift>-<Alt>**, or **<Ctrl>-<Shift>-<Alt>**). To make it possible to hit <Esc> while the screen saver is on and have it minimize to the taskbar, select *Minimized* from the *Run* drop-down list and click *OK*.

Now, whenever you want to turn on your screen saver, just press your shortcut key combination. If you used the Minimized option, pressing **<Esc>** quickly clears the animation out of view, but it will still be running (paused) on the taskbar. To reactivate it, you need to press **<Alt>-<Tab>** to switch to the animation, then **<Ctrl>-P** to start it playing. To save memory and keystrokes, get in the habit of pressing **<Alt>-<F4>** to turn off your screen saver.

Creating New Document Types by Right-Clicking the Windows 95 Desktop

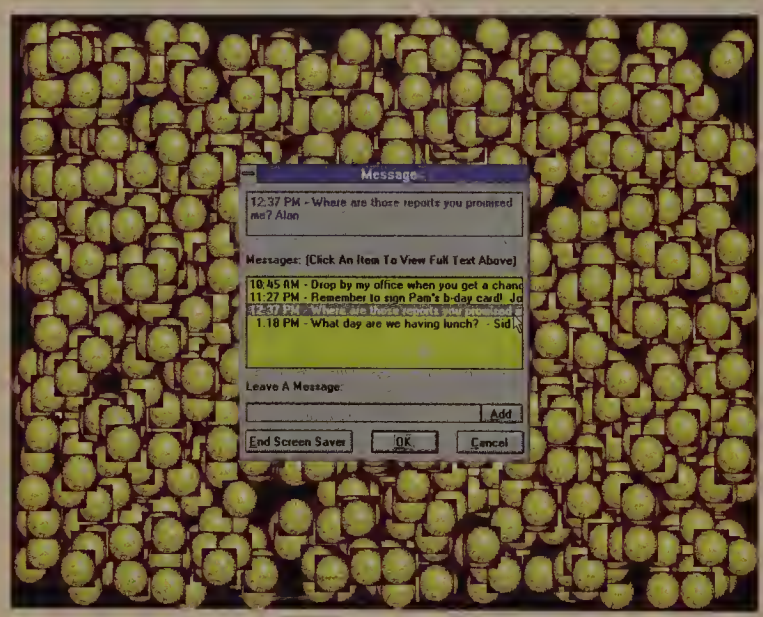
Q Windows 95 lets me right-click on the desktop and select New to create certain kinds of new documents. How do I add new document types, such as PageMaker, to the list?
Pat Bell, Internet

A Unfortunately, Microsoft failed to provide an easy way for mere mortals to add to the New submenu on the right mouse button menu. However, you can do it if you're willing to brave the mysteries of the Windows Registry.

Because changes you make to the Registry can have devastating consequences (you may not be able to restart Windows), you should first copy to floppy disks the following files in your Windows folder: user.dat, user.da0, system.dat, and system.da0. If you don't see them, choose *View•Options* in My Computer or Explorer, click the *View* tab, select *Show all files*, and click *OK*. (For instructions in DOS, see tip 84, "Back Up the Registry," in January's "95 Essential Tips for Windows 95.") If you make a mistake, you can reboot your PC to DOS mode (if necessary, using the start-up floppy you made during setup—you did make one then, didn't you?) and restore the files.

Next, decide what file types you want to add to the New submenu and what applications will open these files. For applications that always start with a new document that's ready for you to start working in, you need no special preparations. But for applications that start with no documents open (such as PageMaker), you must first create and save a template file. Set up a typical

Windows Toolbox: Take Notes, Please



Do you hate finding your PC littered with sticky notes? Visual FX Saver is a free utility that provides a screen saver with a note-taking feature for people who stop by when you're out. Visual FX Saver's main screen-saver tricks are playing animation files (in .aas, .avi, .flc, .fli, and .mov formats) and displaying pictures (in .bmp, .ico, and .wmf formats). Visual FX can paint your screen in several interesting ways and show either a selected picture or every file in a directory, randomly or sequentially. And with the screen saver running, a key press displays a window (with a custom prompt) that lets colleagues add brief notes with automatic time stamps. Jot down your notes as soon as you return, however, because terminating the screen saver erases all notes. Visual FX came into the world courtesy of Tim Hitchings and is available as fxvis201.zip on PC World Online.

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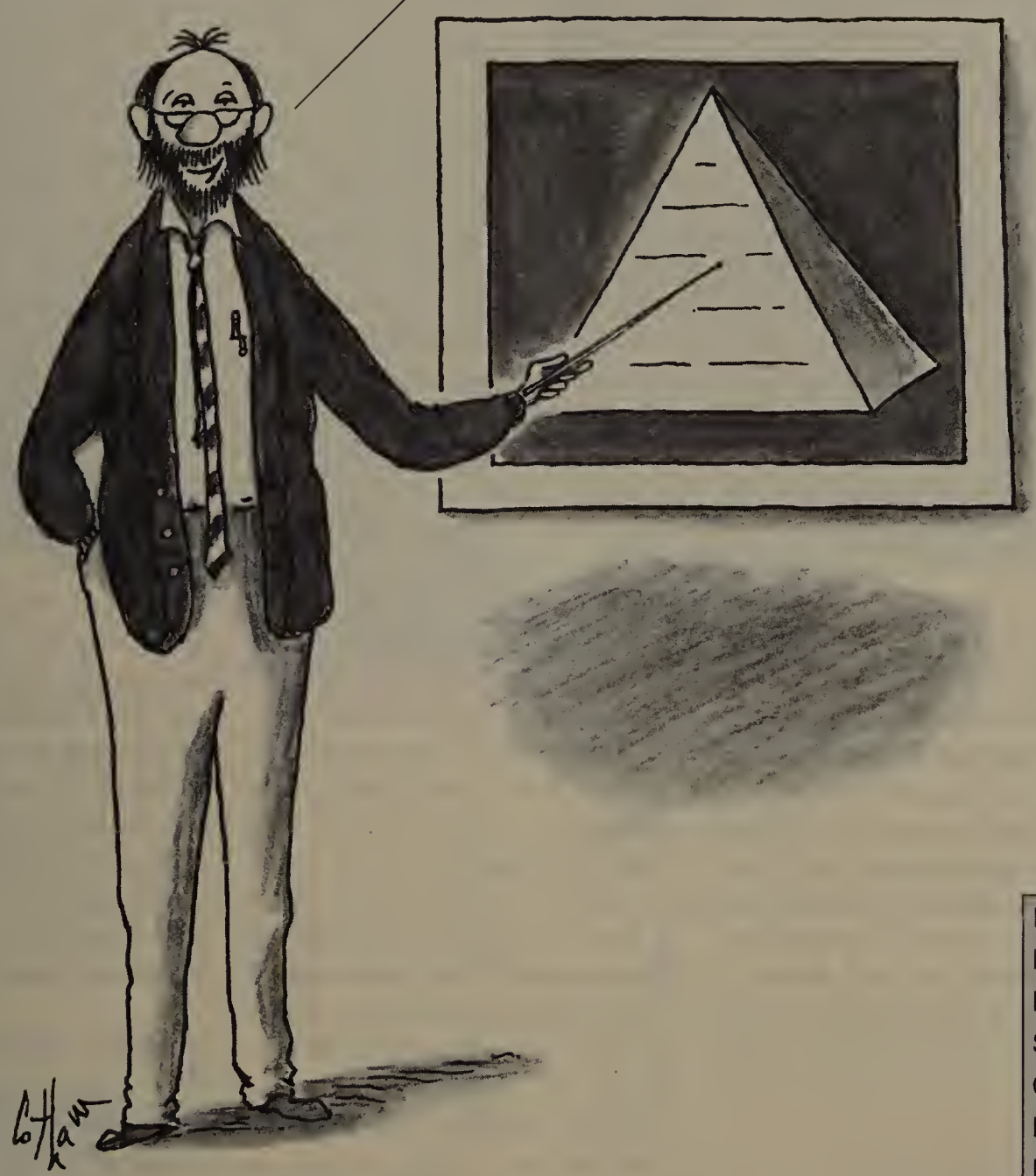

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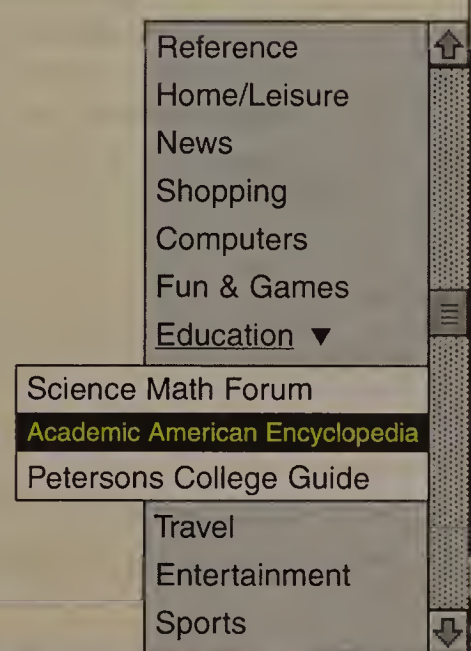

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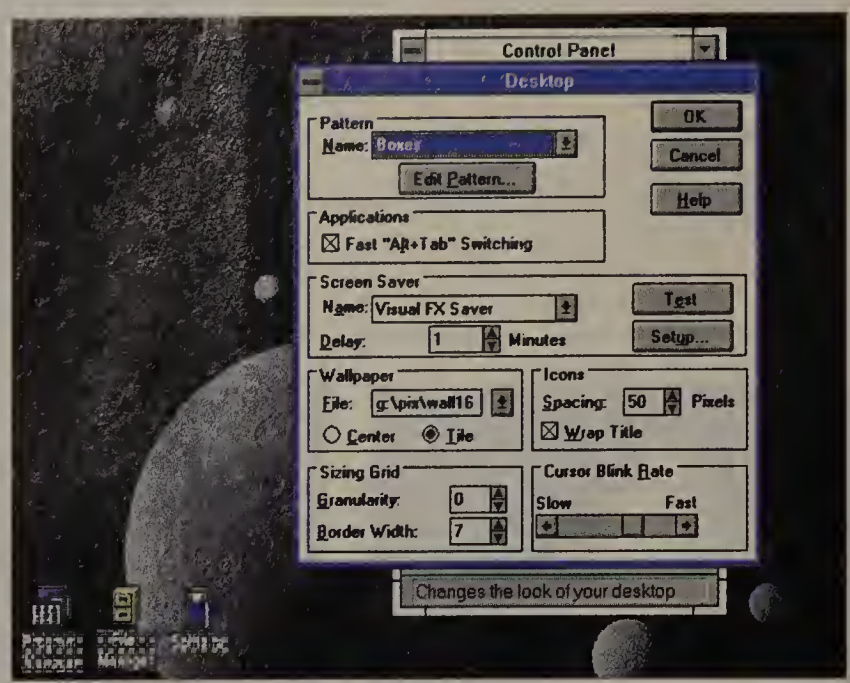

FIGURE 1: TO AVOID UNEARTHLY PATTERNS behind your minimized icons, set the Pattern option in the Desktop Control Panel to None.

document the way you want it, and save it in the ShellNew folder in the Windows folder.

Now start the Windows Registry Editor. Choose *Start•Run*, type **regedit**, and click *OK*. Click the + (plus sign) next to 'HKEY_CLASSES_ROOT'. You should see a series of folders in the left (tree) pane that among other things correspond to the extensions of documents Windows knows. Find the extension of the file type you want to add to the New submenu, and right-click it. Choose *New•Key*. Name the new folder **ShellNew**, and press **<Enter>** to complete the naming process. Next, with your new folder selected, right-click in a blank area of the right pane and choose *New•String Value*. If you're using a file type from a program that starts with a blank document by default, name the new icon **NullFile** and press **<Enter>**. If, however, you're using a file type from a program that starts with no documents open, name the icon **FileName**. Double-click the *FileName* icon (or press **<Enter>**), and, for 'Value data', type the name of the template file you saved in Windows' ShellNew folder. Then click *OK* and exit the Registry Editor. Your changes should appear immediately on the New submenu.

```
@echo off
:loop
win.com %1 %2 %3
@echo.
@echo.
@echo Press D to Exit to DOS
@echo Press W to Restart Windows
@echo.
@echo.
choice /c:dw /t:d,8
if errorlevel 2 goto loop
if errorlevel 1 goto end
:end
```

FIGURE 2: ADD A RESTART FEATURE to Windows 3.x with this handy batch file.

Peeking Behind the Wallpaper

Q I'm having a little headache with Windows 3.11—the backgrounds of the text below the icons of minimized programs have a weird grid pattern behind them.
Terence Chai, Internet

A Somebody has been playing with your desktop pattern, but it's easy to fix that. Start Control Panel and double-click the *Desktop* icon. In the Pattern section, select *None* from the Name drop-down list (see **FIGURE 1**). Then click *OK*. The labels of inactive icons will now have a plain, single-color background.

Restarting Windows (Revisited)

Q In September's *Windows* column, you answered Mr. Schneider's question about adding a restart function to Windows 3.*x* with a batch file called winloop.bat ["Throwing Windows for a Loop"]. I came up with a batch file that's a little more elegant. When you're ready to quit Windows for good, you need only press one key to stop the batch file from restarting Windows.
Paul H. Clinton, America Online

A Thanks, Paul. This is a great way to add a restart feature to Windows 3.*x*. I've made slight modifications to Paul's batch file, which appears in **FIGURE 2**. You put this file in a directory that's listed in your autoexec.bat's path statements, and start Windows with this batch file each day instead of typing 'win' at the DOS prompt. It makes use of the DOS Choice command; the /c:dw switch sets up the d (for DOS) and w (for Windows) keys as the choice. The /t:d,8 switch makes d the default and sets a timer of 8 seconds. If you don't press any key during that time, the batch file will automatically exit to DOS.

Naturally, you can make the default w to restart Windows, and change the time interval to any number of seconds up to 99.

One Size Fits III

Q This morning I used File Manager to format a 3½-inch floppy disk with the capacity set to 1.44MB. When I looked at File Manager's status bar, it said the disk had a total of 1.38MB. Weird! I tried reformatting the floppy for 1.44MB in DOS, but File Manager's status bar still says 1.38. Am I missing something?
Tony F. Marinelli, Warrington, Pennsylvania

A Don't worry, Tony, your disk holds as much in Windows 3.*x* (and Windows 95) as it ever did in DOS. This inconsistency, which shows up in both File Manager and the Windows 95 Explorer, is due to rounding errors and bugs—just one of those glitches Microsoft hasn't bothered to fix.

By Scott Dunn

PC WORLD online *The files mentioned in this article are available on PC World Online. Scott Dunn is a contributing editor for* PC World *and a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995, 800/283-9444).* Windows *welcomes your questions and pays $50 for published items.* *See page 14 for contact information.*

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WINDOWS 95 ADVISER

Saving Energy and Expenses

Consider this: A typical PC monitor draws about 50 watts and, if left on 24 hours a day, consumes about $35 of electricity a year. Fortunately, you can slash its consumption without begging employees to turn off their monitors during lunch or at night.

The Environmental Protection Agency's Energy Star program promotes the use of energy-efficient office equipment, including PCs, monitors, printers, and copiers. To qualify for the spiffy Energy Star logo, the equipment must consume 30 watts or less when idle; many monitors draw less than 15 watts in what's known as suspend mode. So if your monitor or its documentation carries the logo, read on.

Unlike Windows 3.1, Windows 95 offers a built-in capability to power down Energy Star monitors. But you'll have to do some fiddling to make it work.

In the Control Panel, double-click the *Display* icon, click the *Settings* tab in the Display Properties dialog box, and then click the *Change Display Type* button. If your monitor type is Unknown, click the *Change* button, make sure *Show all devices* is selected, then pick your monitor from the list. Once you do, the 'Monitor is Energy Star compliant' setting should be checked in the Change Display Type dialog box. If it isn't, and you're certain your monitor is compliant, check the box.

Next, configure the Energy Star settings. In the Display Properties dialog box (see figure), click the *Screen Saver* tab. If the bottom of the tab shows the Energy Star settings, check *Low-power standby* and set a time (15 minutes is reasonable). You must check this setting because on many monitors the 'Shut off monitor' setting doesn't work. Once it's checked, you're done.

Windows 95 offers a built-in capability to power down Energy Star monitors–but you'll have to do some fiddling to make it work.

For many of you, however, the bottom of the Screen Saver tab will be blank. This means your display adapter does not support a standard known as DPMS (the Display Power Management Signaling specification), so Windows 95 won't display the Energy Star settings.

Don't despair! There are several possible solutions:

- Some display adapters support DPMS via a TSR program; Windows 95 will display the Energy Star settings once you load the TSR from autoexec.bat. Check your display adapter documentation to see if your vendor provides a DPMS TSR.
- If you have such a TSR and the settings still don't appear after you load it, try bypassing Windows 95 and controlling your monitor directly, using the command-line settings of the TSR.
- If even the TSR command-line settings won't suspend your monitor, it's because some DPMS TSRs work only when run full screen and in the foreground. Since it's not practical to run a full-screen DOS session in the foreground continuously, start the TSR from the Microsoft Plus System Agent scheduler instead. Right-click the TSR in the Explorer, select *Properties*, click the *Screen* tab, and then click *Full-screen*. Then, in the System Agent, select *Program•Schedule a New Program*, type in the command line of the TSR on the Program line, click *When to Run...*, click *Wait until I haven't used my computer for*, and set the time to, say, 15 minutes.
- Finally, you can try UniVBE, a driver program from SciTech Software that supports DPMS. UniVBE doesn't work on all systems, but it's shareware so there's no risk in giving it a try. It's available at **http://www.scitechsoft.com.**

Most monitors shipped by major vendors in the past two years are Energy Star compliant. So are most recent printers, which go to sleep automatically after a period of time. Many of the latest PCs also are automatically compliant. For a list of Energy Star equipment, see **http://www.epa.gov/energy_star.**

By Richard Freedman

Richard Freedman, former group manager on Microsoft's Windows 95 team, is a PC World *contributing editor and vice president at a real estate investment firm in Stamford, Connecticut. See page 14 for contact information.*

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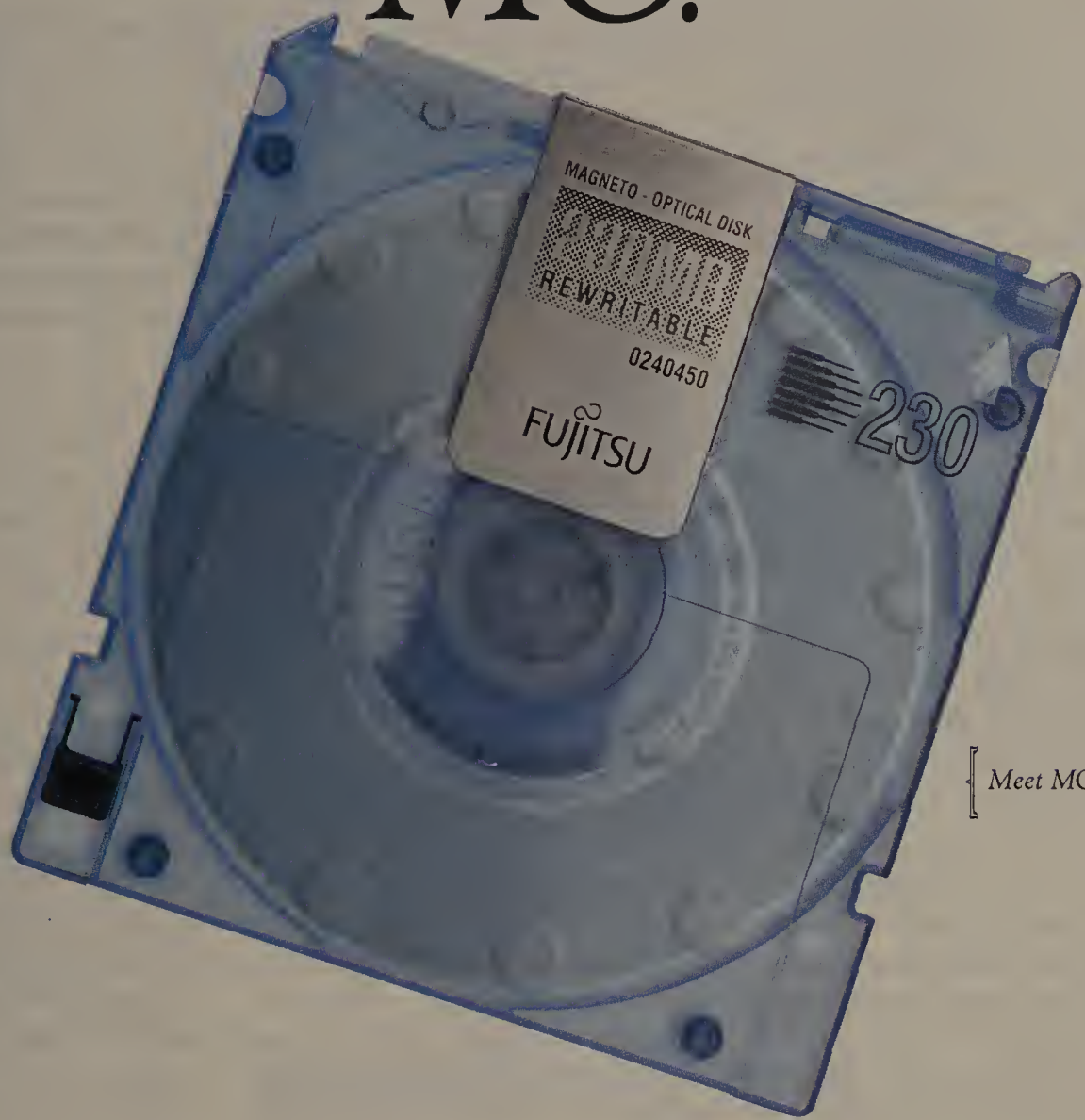

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DATA MANAGEMENT Q & A

Keeping Garbage out of Your Database

Q My coworkers enter the same data differently in certain fields of our database. For example, in the State field they enter California as *CA*, *Ca*, and *ca*, resulting in inaccurate reports. I then have to go in and manually clean up the database. Is there a way to control what gets entered in the first place?
Brian Clarridge, Quincy, Massachusetts

A Most database managers use several methods to control data entry, depending on such considerations as how many possible values exist for a field, whether formatting is important, and whether the field can be left blank.

For example, you can restrict a department field to the codes 101–999, or to the names of valid company departments. Or you can make data entry even easier by providing a default department if it's the most common one.

You can also force users to enter, say, social security numbers in a specific format, or state codes in uppercase.

Some fields may require multiple rules. You may not want a salary field, for example, to exceed a certain value or to be left blank.

Here are some data-checking options for Paradox, Access, and Approach.

Paradox Pictures and Lookups: When you create a field in a Paradox table, you can include a picture, or template, of its valid format. A picture can include constant characters, such as the dashes in a phone number.

To add a picture to a Paradox field, highlight the field in the Create Table or Restructure Table dialog box and be sure Validity Checks is selected in the Table Properties drop-down menu. Enter a picture format directly into the '5. Picture' box, or click the *Assist* button for help (see **FIGURE 1**).

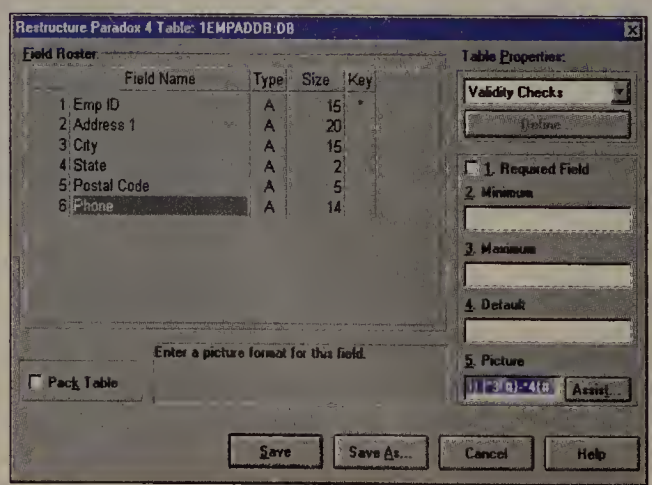

FIGURE 1: A PARADOX PICTURE is a template of the valid data format for a specific field.

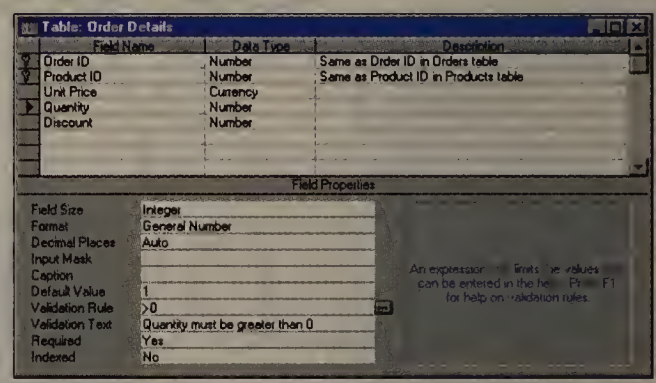

FIGURE 2: IN ACCESS, enter your input mask or validation rule directly on its line, or click the ... button at the end of the line for wizard help.

Another way to control data entry is to limit the values in a field to those in the key field of another table. Highlight the field in the Create Table or Restructure Table dialog box, click *Table Properties*, choose *Table Lookup*, and click *Define*. In the Table Lookup dialog box, pick the lookup table and the way you want to access it.

Access Masks, Rules, and Combo Boxes: Access lets you add input masks, validation rules, and default values to fields while you're designing a table or form. In the Table Design window, click the field you want to limit. Then in the Field Properties section of the dialog box, click on the line next to the desired type of data entry control (see **FIGURE 2**). In the Form Design window, select the field, right-click to open the field's Properties menu, and click on the line to choose the control.

You type a mask or rule directly on its line, or click the ... (ellipsis) button to open the Input Mask Wizard or the Expression Builder dialog box.

Input masks, like Paradox pictures, let you force data entry to match a template. The Input Mask Wizard offers several ready-made templates. To add your own, choose *File•Add-ins•Add-in Manager*, highlight *Control and Property Wizards*, and click *Customize*. Double-click *Customize Input Mask* to open the box where you add your masks.

Validation rules let you apply more complicated criteria to limit a field's values, but they're tricky if you don't know Access's programming language.

If you want a user to select a field value from a drop-down list, replace the regular control object for the field with a List Box or Combo Box from the Form Design Toolbox palette. A List Box limits a field's values to those on the list; a Combo Box lets you enter other values. A wizard will help you add one of these controls to a form, after you click its icon on the Toolbox.

Approach Data Entry Checks: With Approach, you enter all data entry rules in the Field Definition dialog box. Open the form in Design mode, choose *Create•Field Definition*, highlight the field to limit, and click *Options*. You'll see two tabbed pages: one for entering default values (creation date, constants, and so forth) and another for entering validation rules. Click *From* on the Validation page to limit values to a range, *One of* to create your own set of possible values, and *In field* to specify a field in another file. Click *Formula* to create more-complex validation rules.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World *and author of* The Paradox 5.0 for Windows Handbook *(Random House Electronic Publishing, 1994, 800/793-2665).* Data Management *welcomes your questions and pays $50 for published items. See page 14 for contact information.*

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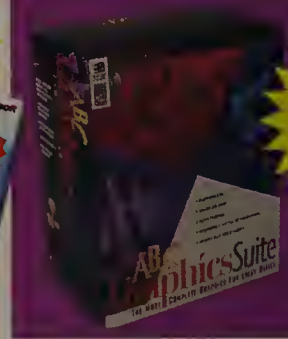

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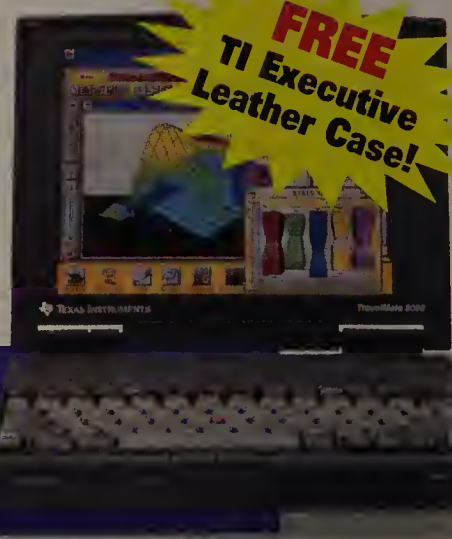

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PRESENTATIONS Q&A

Group-Annotating Presentations in PowerPoint 95

Q My company has Microsoft Office 95, and we want to use PowerPoint to produce collaborative presentations. We're looking for the best way for coworkers to annotate a presentation file when passing it around a workgroup. What's your recommendation?
Steve Tiffenbach, PC World Online

A Although PowerPoint 95 doesn't offer annotation tools like those in Word 95, its Meeting Minder feature allows you and your coworkers to record comments.

Meeting Minder was designed primarily to be used by a presenter during an on-screen presentation—for example, to take notes, report meeting minutes, and track action items. However, it also lets workgroup members add their own annotations about each slide in the same presentation file. Best of all, you can export the annotation text from PowerPoint to Word.

Here's how the members of your team can use Meeting Minder.

1. With the PowerPoint presentation (.ppt) file open, click the *Slide Show* icon at the bottom of the screen to view the presentation.

2. During the slide show, you can add comments to any slide by clicking the right mouse button (to pause the show) and selecting *Meeting Minder* from the pop-up menu. Enter your comments in the Meeting Minutes page of the dialog box that appears, as shown in the figure below. When you finish typing your remarks about that slide, add your name or initials, then click *OK* to restart the slide show. Repeat this sequence whenever you want to add comments.

3. When you're finished, save the .ppt file and send it on to the next reviewer in your workgroup. (This is a de facto trust-building exercise: Nothing stops anyone from editing or deleting someone else's remarks.)

When everyone has finished adding their two cents worth, export the Meeting Minutes to Word 95: Open the presentation file in PowerPoint 95, select *Tools•Meeting Minder*, click the *Export* button in the dialog box, select *Send Meeting Minutes and Action Items to Microsoft Word* in the next dialog box, and click *Export Now*.

Word 95 jumps into action and creates a file that lists each slide by number and title, including its Meeting Minutes. If you don't have Word 95, Meeting Minder's export option lets you add your Meeting Minutes to your presentation's notes pages instead.

USE POWERPOINT 95's MEETING MINDER TO COLLECT COMMENTS about a presentation and then export them to a Word document.

Pumping Up Speaker Notes in Freelance

Q I need more room to add text to some of my speaker notes in a Freelance Graphics 2.1 presentation, but the program limits me to half a page for each slide. Any suggestions?
Harry B. McCarty, Annandale, Virginia

A That's a tough nut. Because Freelance Graphics 2.1 doesn't provide a master notes page, there's no way to change the size of the slide image or the notes area on the printed page, as there is in other Windows presentation packages. Instead, Freelance's template always prints the slide image on the top half of the page and speaker notes on the bottom half.

Fortunately, there are some workarounds. The first trick is to use a type size for speaker notes that's smaller than Freelance's default. This technique lets you include more text in the bottom half of the printed page—as long as you choose a size that's big enough to read from the podium.

Using Freelance's Speaker Notes tools, you can change the default size for all speaker notes in your presentation or for just those pages where you need more space. With your Freelance presentation open in Current Page view, go to a page where you need more room for speaker notes. Select *Page•Speaker Notes* or click the *Speaker Notes* icon. This will open a dialog box that provides a speaker notes form for each page. Then choose *Text•Size*, and select a smaller point size. Click *OK* to change the text size for that notes page only, or select the *Apply to all speaker notes* check box and then click *OK*.

If you upgrade to Freelance Graphics 96, you can type as much text as you want in your speaker notes, and the program will then provide automatic scaling options to fit all the text on the printed page.

By Richard Jantz

Richard Jantz is a contributing editor for PC World *and an electronic publishing and presentations consultant in Kensington, California.* Presentations *welcomes your questions and pays $50 for published questions. See page 14 for contact information.*

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ONLINE Q&A

Saving Web Page Info to Disk

Q I'd like to save to disk information that I find in pages on the World Wide Web. Can you tell me how?
Andrew Border, Lafayette, Indiana

A The procedure for capturing information from pages depends on the software (and online service) you use to connect to the Web. Some browsers let you cut and paste text from pages onto the Windows Clipboard. And some, like NCSA's Mosaic browser, let you double-click on a document to transform it into an OLE object, then drag and drop it into another application. In general, though, to save a Web page, select *File•Save* or *File•Save as* from your browser's menu, and enter a file name (see the figure below).

Your Web browser will save the page as an .htm file with text and HTML coding (but no graphics), which you can later view offline as a local file in your Web browser or in any text editor. Your browser will display it just as you see it on the Web, but without the graphics, while your text editor will show the text surrounded by HTML coding. (If you save the page with a .txt extension, your browser—or text editor—will display only plain text.)

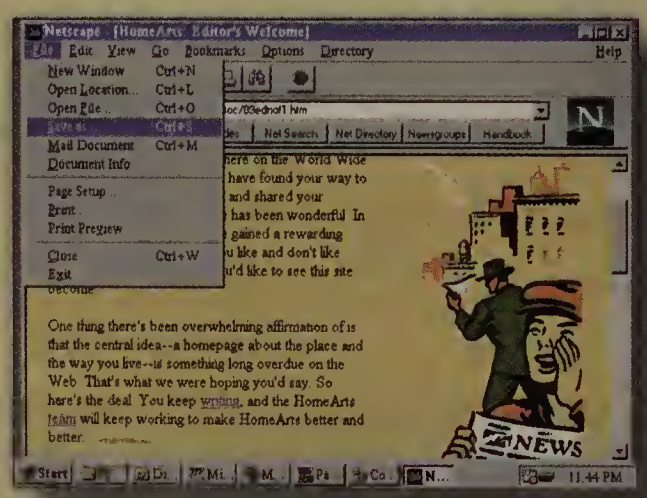
If you're using CompuServe/Spry's Mosaic, select *File•Document Source•File Save as,* then enter a file name. In Prodigy's Web browser, select *File•Save as*, then enter a file name.

If you connect to the Web via America Online, you also select *File•Save as* and enter a file name. But to view the pages, you need to be connected to AOL: Instead of displaying the page you've saved, AOL takes you to the page on the Web and displays it without its graphics. Or you can view the saved page in a word processor.

Mosaic and Netscape's Navigator let you save individual pictures from Web pages: Move your mouse cursor to the center of the picture, click the right mouse button, and select *Save Image.*

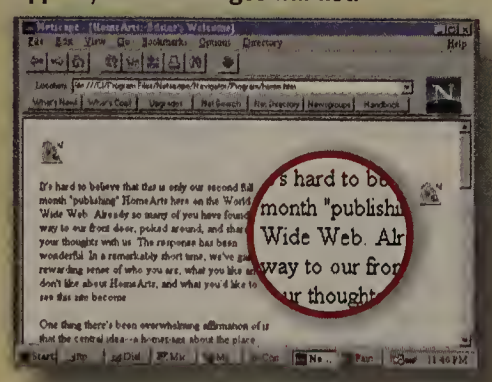
To save Web pages with both text and graphics intact, use the shareware utility Internet Bookmarks (available on PC World Online as **Ibmarks2.exe** and **Ib104.zip**) or snap a picture of the screen with a screen capture utility; or press **<Alt>-<Print Screen>** to save the screen to the Windows Clipboard as a bit map, then paste it into Windows' PaintBrush (or any utility that reads .bmp files).

Save a Web Page to Disk

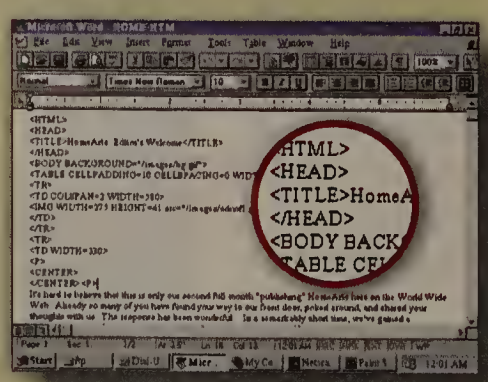


To save a Web page, select File • Save as from your browser's menu. The Browser will save the page in a file with the .htm extension.

View it as a local file in your Web browser text editor, and the text from the page will appear, but the images will not.



View that same .htm file in your text editor, and you'll see its HTML coding.



Finding Car Deals Online

Q Where can I go online to look up dealer invoice prices for new cars? And what about other research to help in car buying, like crash test results and reliability reports?
Anne Baker, Dallas

A You'll find Edmund's Automobile Buyer's Guide on the Web at **http://enews.com/magazines/edmunds**. In the electronic version of this venerable handbook, you can look up dealer invoice prices and incentives for new cars as well as prices for used cars. You'll also find advice on buying or leasing a car.

But don't stop there. Head to the Web's Cyberspace Automotive Performance Automotive Information Server at **http://CyberAuto.Com:80/catalogs/auto_info/auto_info.html** for information on recalls, plus a database of dealer technical service bulletins. The site also links to other pages for particular models.

Consumer Reports' reliability reports and test drive reviews for models dating back to 1987 are available on CompuServe (go **consumer reports**), Prodigy

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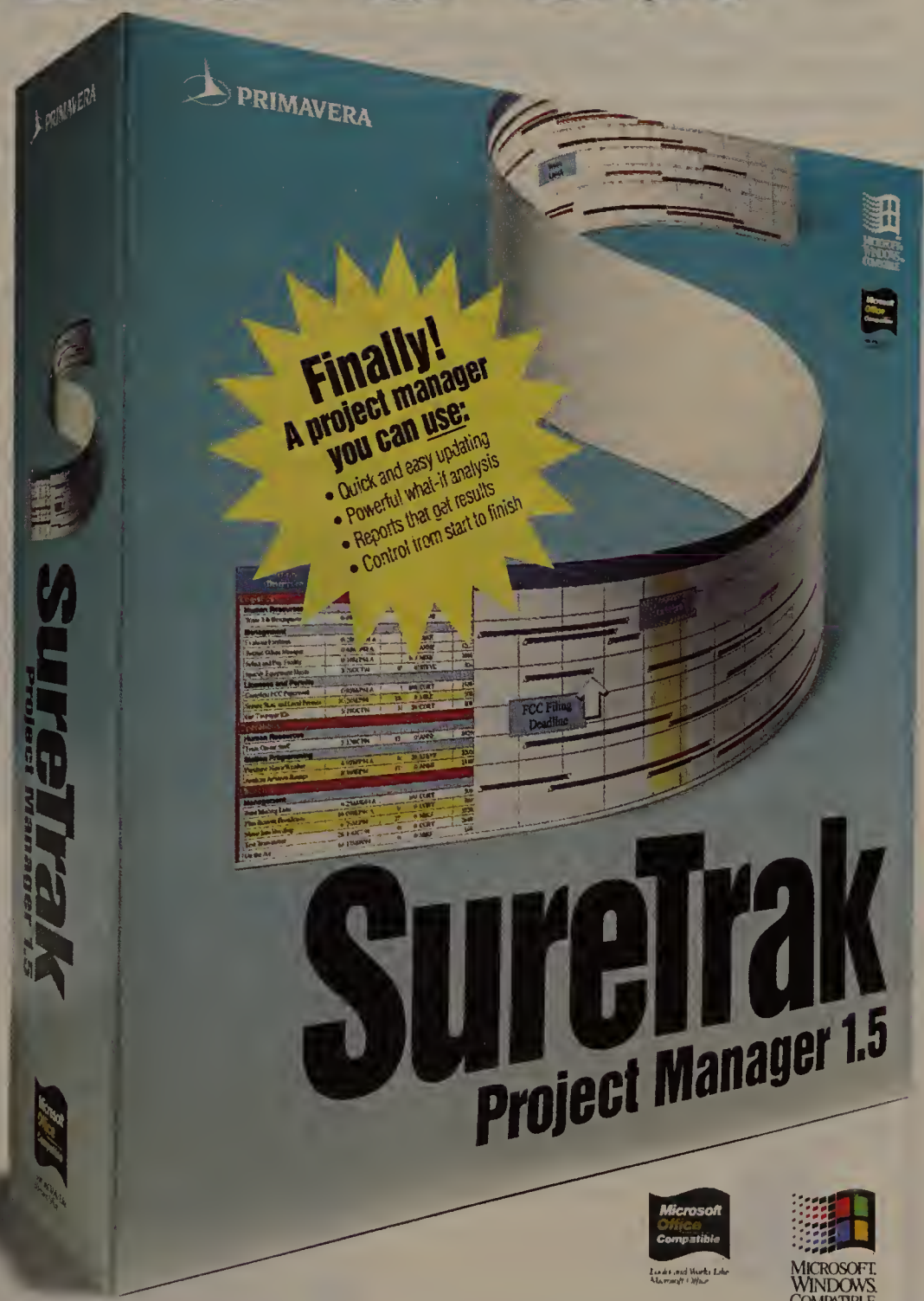

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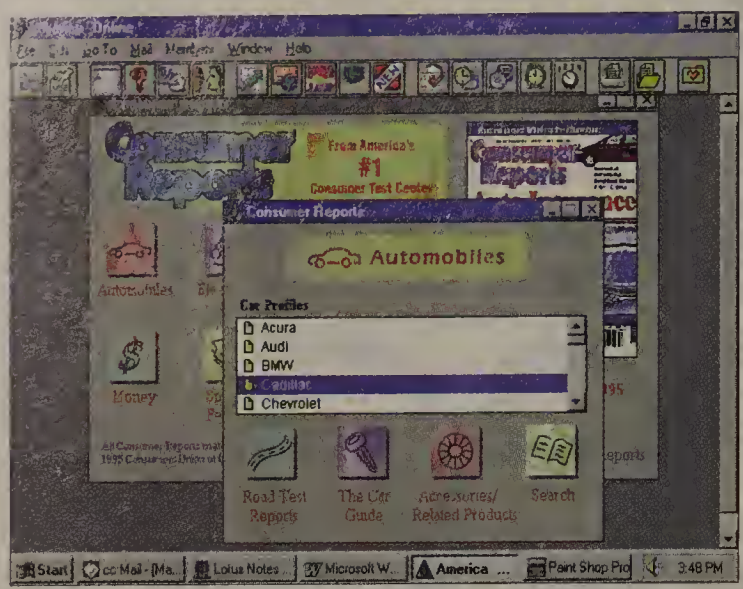

CONSUMER REPORTS on America Online, CompuServe, and Prodigy offers reliability reports and test drive reviews for car models dating back to 1987. Only AOL (shown here) offers the full text of numerous Consumer Reports stories.

(jump **cars**), and America Online (keyword **consumer reports**, then click *Automobiles*). But head to America Online for the full text of invaluable *Consumer Reports* stories on cars and car buying (see the figure above).

Car and Driver on AOL (keyword **car and driver**) offers road test reviews, new car specs, and lots of car chat.

The libraries in CompuServe's Automobile forum (go **auto**) are another good stop. You'll find copies of J.D. Power and Associates' customer satisfaction surveys, results of crash tests by the National Highway Traffic Safety Administration, a "used car lemon checklist," lists of cars that are expensive to insure, and lots of advice on car buying.

Finally, talk it up with car aficionados in the car forums of your online service. Join the Internet discussion mailing lists that exist for popular car lines. To find them, ask in the car forums of the major online services.

Automate Internet Log-Ons in Windows 95

Q Is there a way to get Dial-Up Networking in Windows 95 to automatically enter my user name and password into Internet SLIP or PPP connections? I'm getting tired of typing those things myself.
Jason McPatrick, Detroit

A Amazingly, Microsoft failed to endow Windows 95 with this essential feature. But there's a free utility that will enter your Internet ID and password for you. Robo-DUN, Dial-Up Networking Script Utility, by Mark Gamber, lets you script Internet log-ons in Windows 95 with commands similar to those used in programs like Procomm Plus. It's on PC World Online (**robodun.zip**) and the Web (**http://www.NetEx.NET:80/w95/windows95/internet/**).

By Judy Heim

PC WORLD online *The files from this article are available on PC World Online. Judy Heim is a contributing editor for* PC World *and author of* I Lost My Baby, My Pickup and My Guitar on the Information Highway *(No Starch Press, 1995, 800/420-7240). Online welcomes your questions and pays $50 for published items. See page 14 for contact information.* ■

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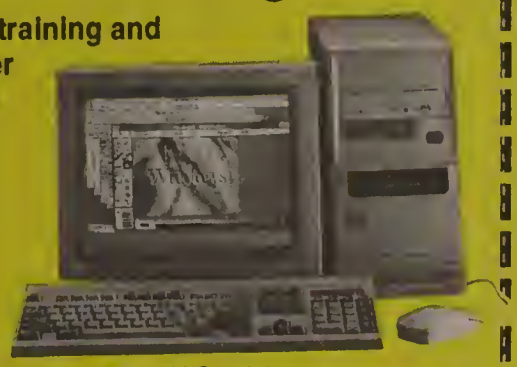

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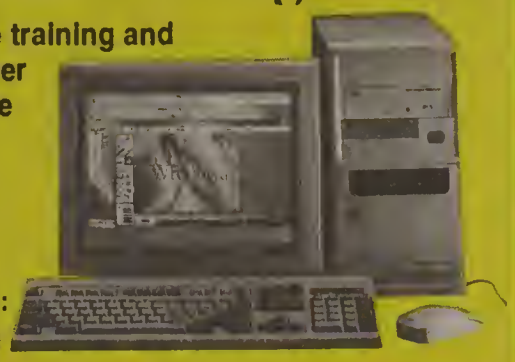

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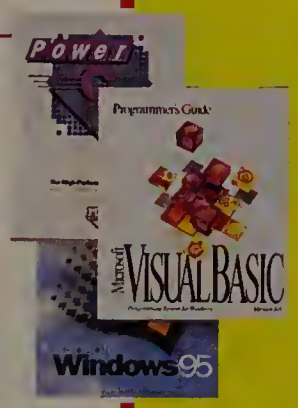

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HARDWARE Q&A

Sound Falls on Windows 95's Deaf Ears

Q I just upgraded to Windows 95 and discovered I can no longer use my Ensoniq Soundscape card. Windows 95 simply refuses to recognize it. Can you suggest a way to get it running again?
Norman Watt, CompuServe

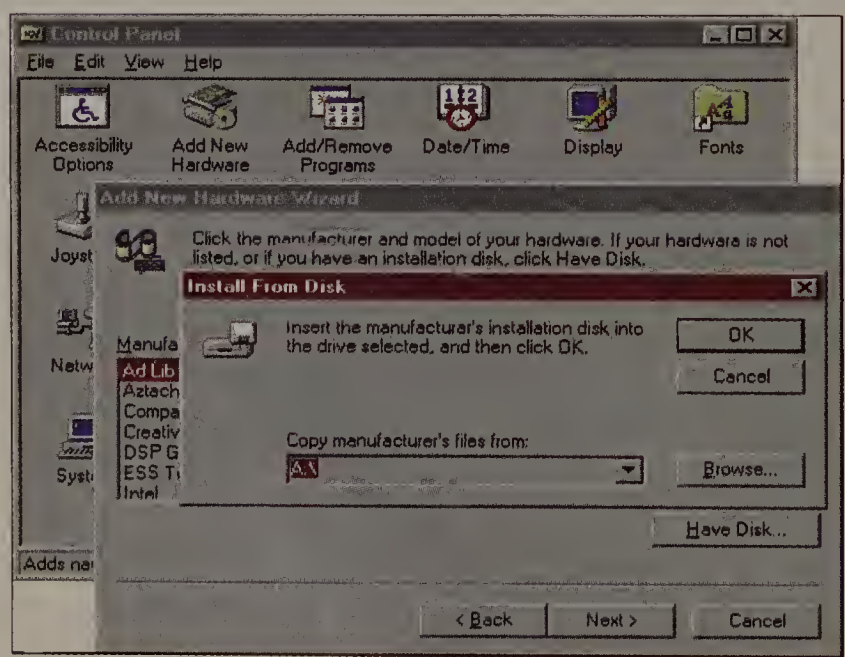
A Although the Soundscape is a popular wavetable sound card, a 32-bit driver wasn't ready in time to ship with Windows 95. And Windows 95 can't detect the card, even as a generic device. When Windows 95 comes up empty like this, try the following procedure—it's awkward, but it works.

First you'll need to have on hand the current MIDI and Wave device I/O settings for your sound card. If you don't have a record of them, display the settings by running the card's configuration utility (SSInit for Soundscape) from Windows 95's MS-DOS mode prompt. Since the card worked before, just make a note of the settings without changing them.

Next you'll need to call the manufacturer's BBS (610/647-3195 for Ensoniq) and download the latest Windows 95 driver into an empty directory. (The name of Soundscape's self-extracting file will be something like **w95b3x.exe**. If you want DOS mode compatibility, also download the files **w95appsa.exe** and **w95appsb.exe**.) Once you've extracted the files, double-click the *Add New Hardware* icon in Windows 95's Control Panel. Be sure to answer *No* when Windows 95 asks if you want it to search for new hardware.

From the list of hardware types that appears, double-click *Sound, video and game controllers*. In the subsequent screen, you'll see a list of manufacturers and models. Ignore the list, click the *Have Disk* button, and enter the path for the directory where you put the new driver. When you're asked to select the installed device, choose *Ensoniq Soundscape*. You'll be presented with two I/O addresses—and here's where things may get tricky. With devices like the Soundscape, which aren't Plug and Play compatible, Windows 95 uses the driver to figure out the possible IRQ, I/O, and DMA settings for the card. Then Windows 95 matches these settings against the resources it thinks are available (including the ones already taken by your sound card, since Windows 95 can't detect it). If the card has more than one possible setting that matches a free IRQ, I/O address, or DMA channel, Windows 95 chooses likely settings out of those that are available.

Now whip out that piece of paper on which you wrote your sound card's actual I/O settings, and see if Windows 95 guessed right. If you don't see a match, click *Finish* anyway, but when Windows 95 asks if you want to reboot now, click *No*. Next, reboot your system in MS-DOS–compatible mode, run your card's configuration utility, and change the settings there to match Windows 95's guesswork. Start Windows 95, and your sound card should finally work.



TO INSTALL A DEVICE NOT LISTED in the Add New Hardware Wizard, click the Have Disk button and enter the path where the device's driver resides. If you run into hardware conflicts, reset the device's parameters by running its installation software in DOS mode.

Buying CMOS Insurance

Q I am interested in a PC utility that creates a reference disk in case the CMOS information is lost. Does such a utility exist? If so, where can I find it?
Victor Ruiz, Internet

A Actually, I have something even better: BatteryDisk from International Systems. You just pop the program disk in your A: drive and enter **setup**, and it turns itself into an emergency boot disk containing all the settings in your system BIOS. If your CMOS battery dies, just boot from the emergency disk, and your settings are restored. Of course, if you add a hard disk or make some other change that affects the BIOS, you must remember to run the setup routine again. Otherwise, it's pretty foolproof.

- **BatteryDisk** $19.95; International Systems; 800/248-4217, 312/222-1364
  Reader service no. 632

Giving Disk Manager the Boot

Q I just transplanted a 1.2GB hard disk from an old system to a new one. The old system did not have an Extended-IDE BIOS, so to break DOS's 528MB limit, I had prepared the disk with OnTrack's Disk Manager software. However, the new system has an EIDE interface card, which I'm told is incompatible with Disk Manager. How do I uninstall Disk Manager?
Robert Kyle, Minneapolis

A OnTrack's Disk Manager works at a very low level, so if you want to remove it you must repartition and reformat your hard disk. Just like an EIDE BIOS or an EIDE interface

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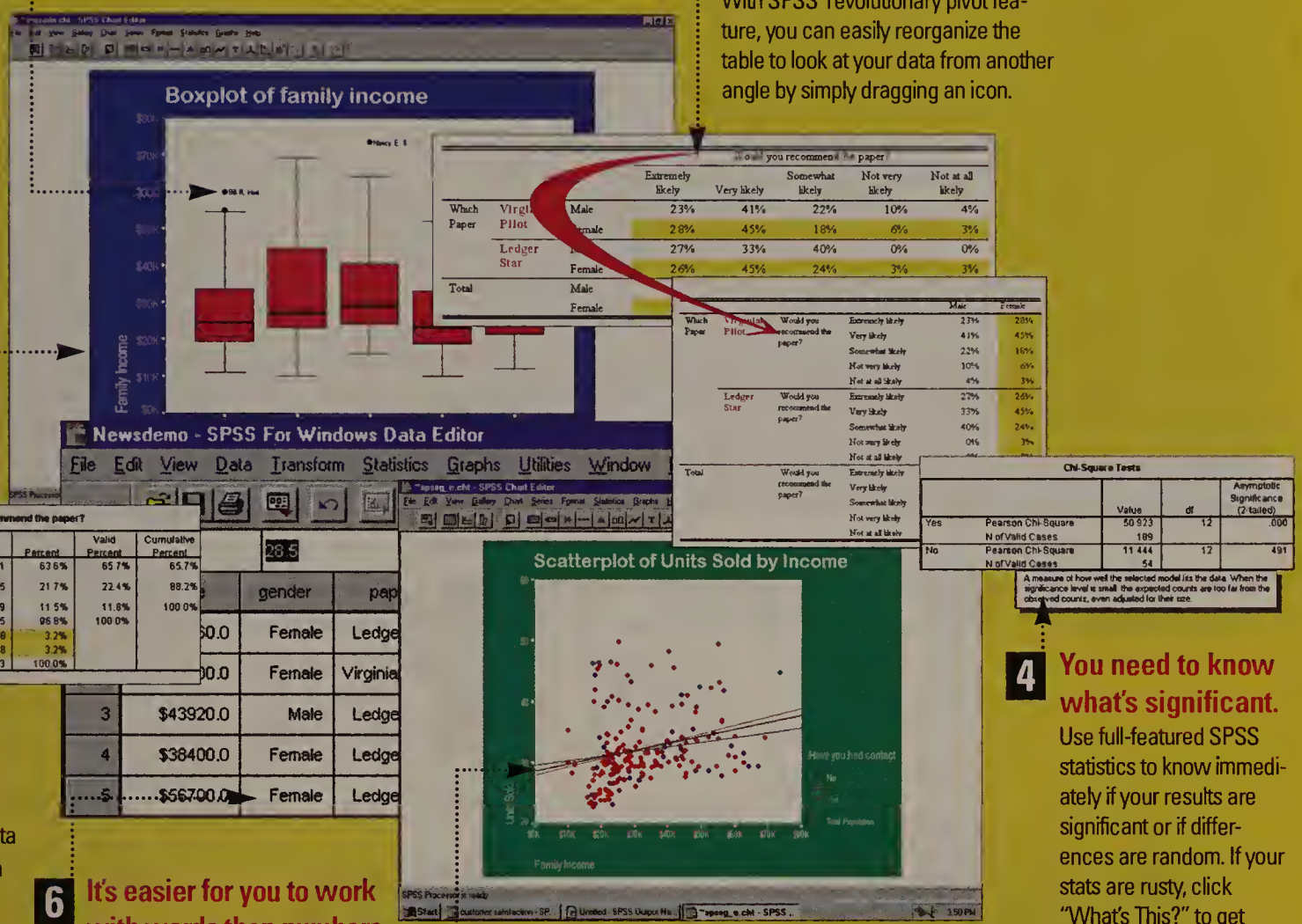
3 You need to look at the data more than one way. When you create a report, what you see often leads to more questions. With SPSS' revolutionary pivot feature, you can easily reorganize the table to look at your data from another angle by simply dragging an icon.



4 You need to know what's significant. Use full-featured SPSS statistics to know immediately if your results are significant or if differences are random. If your stats are rusty, click "What's This?" to get explanations, definitions and rules of thumb for statistics or results.

5 You need to separate the apples from the oranges. SPSS lets you quickly and easily run reports and graphs for different groups so you can look at them separately or compare them.

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card, Disk Manager enables you to break DOS's 528MB limit by translating cylinder and head information about your drive. If you plug a drive prepared with Disk Manager into a system or card with an EIDE BIOS, the two schemes conflict, and your drive won't work.

Here's how to get rid of Disk Manager. (These steps will also work with another popular drive prep program, Micro House's EZ Drive.) If you have more than one hard disk, you may want to disconnect the hard disk(s) you are *not* working on to avoid confusion.

1. Create a boot floppy with the command **format a:/s**, then copy DOS's fdisk.exe and format.com onto the floppy. *Do not* copy your config.sys file over to the floppy disk.

2. Since you'll be destroying all data on your hard disk, do a complete backup first. Use a DOS-based program so you won't need to reinstall Windows before you can restore your files.

3. Run your system setup utility, and make sure your boot sequence is set to A: first, then C:. Not all setup routines have this option; don't worry if yours doesn't.

4. Reboot your system from the floppy disk, and enter **fdisk /mbr** at the A: prompt. You won't see anything happen, but this command overwrites the translation information Disk Manager has written on the first track of your hard drive.

5. Next, enter **fdisk** at the A: prompt. Then enter **3** for 'Delete partition or logical DOS drive'. From the subsequent menu, perform every delete action possible, including 'Delete Non-DOS Partition'.

6. When you're done deleting the old partition(s), use **fdisk** again to create a new primary DOS partition, which can be the entire drive or some smaller portion if you wish to create multiple logical drives (C:, D:, E:, and so on). I recommend one big drive. You may save 10MB or 20MB if you create multiple drives on a gigabyte hard disk, but it's much easier to set up and manage a single logical drive.

7. Format your hard disk's bootable partition with **format /s**, and restore your backup to the drive.

Most drives over 528MB come with either Disk Manager or EZ Drive. In my opinion, an EIDE BIOS in a system or on an interface card is always better than either software option. For one thing, both Disk Manager and EZ Drive use a driver that eats a small quantity of precious conventional memory, and whenever you load a driver, the possibility of conflict with other drivers arises. Finally, because Disk Manager and EZ Drive store vital drive overlay information on the first track of your hard disk, you may never see your data again if that track gets damaged. By contrast, you have a better chance of accessing a hard disk that Disk Manager or EZ Drive hasn't messed with, even if a damaged first track keeps it from booting.

By Eric Knorr

Eric Knorr is a contributing editor for PC World *and editor and principal author of* The PC Bible *(Peachpit Press, 1995, 800/283-9444).* Hardware *welcomes your questions and pays $50 for published items. See page 14 for contact information.* ■

COMING UP

What's the Good Word?: Word Pro vs. Microsoft Word

Which should be your 32-bit word processor? We pit Lotus's Windows 95 contender against Microsoft Word and look at performance, OLE 2.0 support, file management, group editing, and much more.

Affordable Removable Storage: Which Format Fits

Need an easy way to archive or take large files on the road? Removable storage is now mainstream. We tell you whether to invest in Syquest or Iomega drives, or look at other formats such as optical drives.

PC Reliability and Service: At Home and at Work

Our latest survey of over 10,000 readers fills you in on the ratings of top PCs in reliability and the best companies for service and support. Plus a look at the difference in service and reliability for home PCs.

Also Next Month

- **The PC World Top 20 Power Desktops, Budget Desktops, and Notebooks, plus the PC World Top 10 Workgroup Printers, Graphics Boards, 15-Inch Monitors, and Modems**
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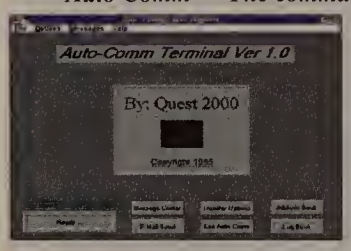

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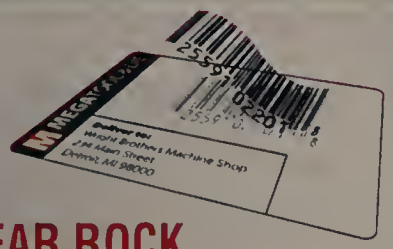

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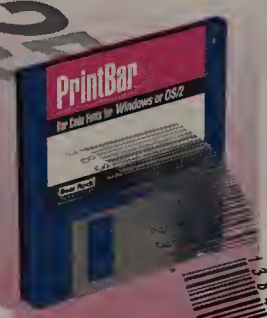

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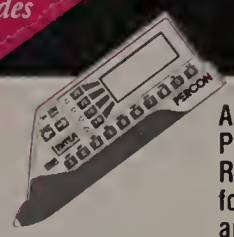

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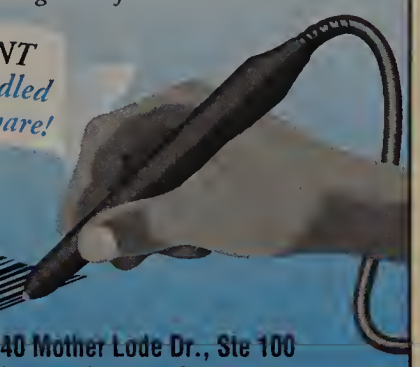

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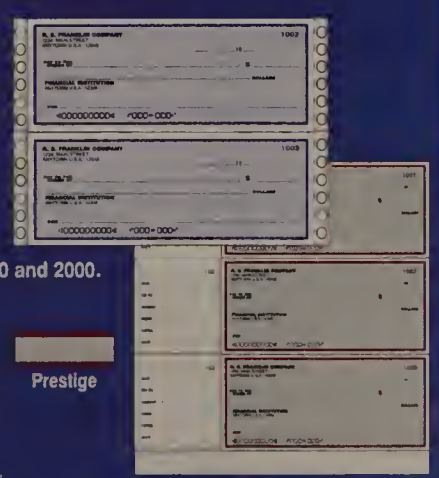

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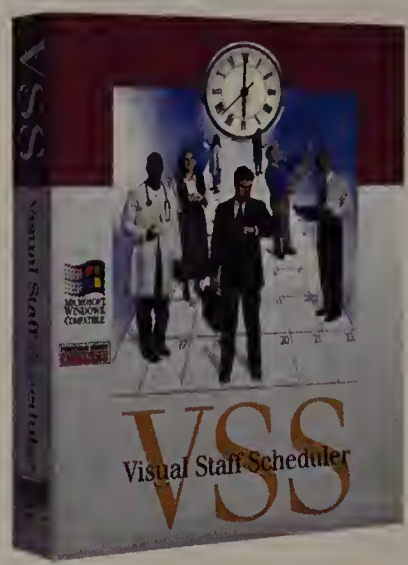

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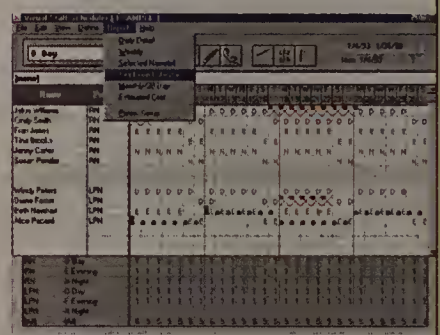

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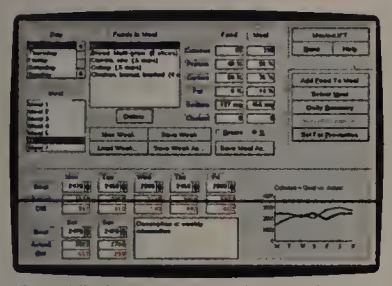

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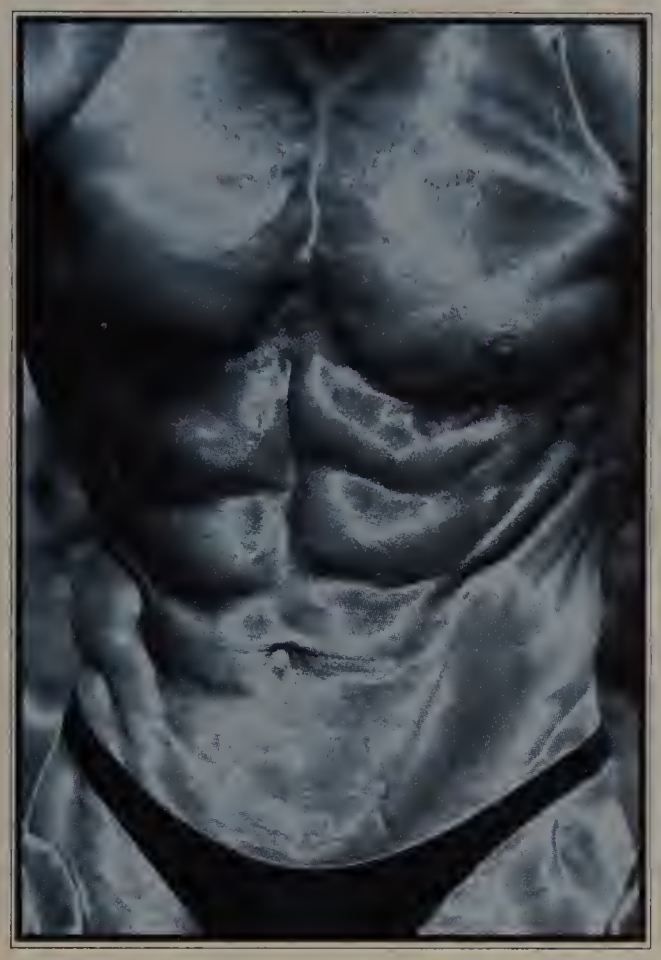

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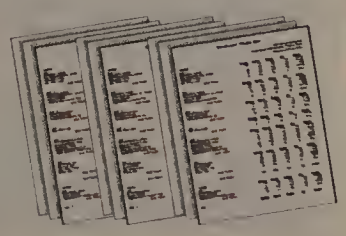

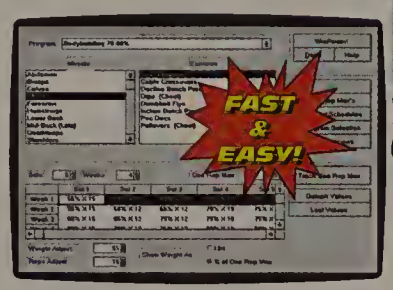

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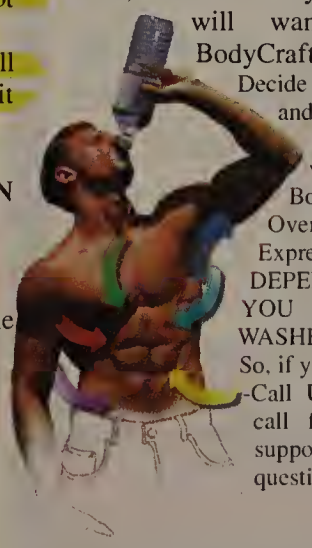

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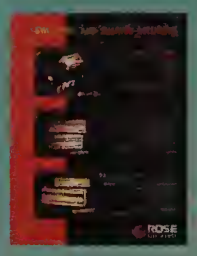

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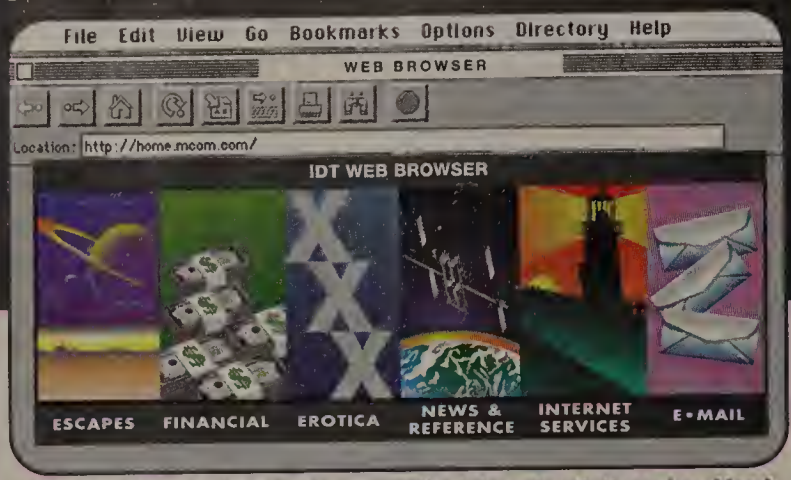

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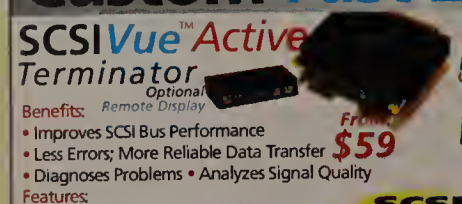

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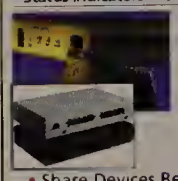

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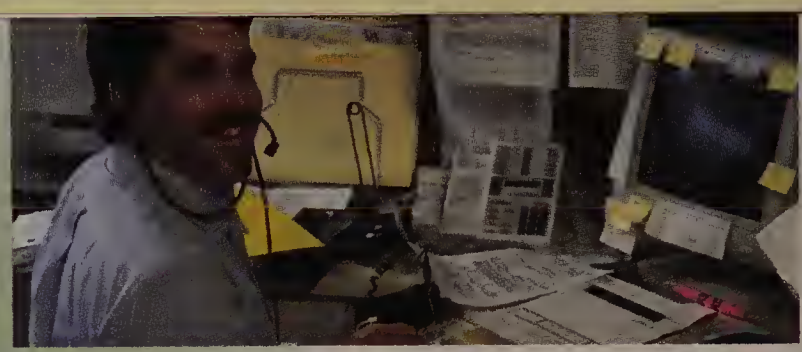

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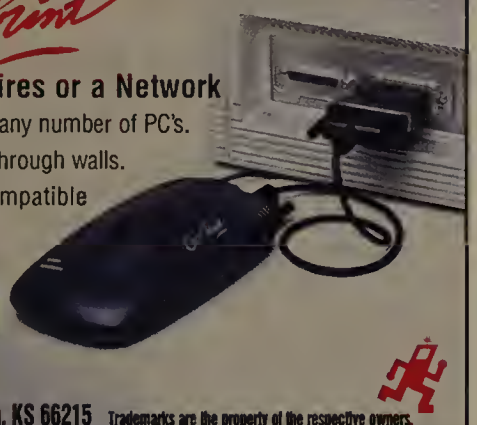

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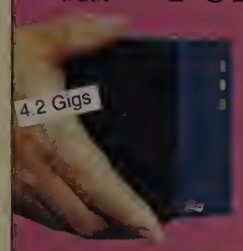

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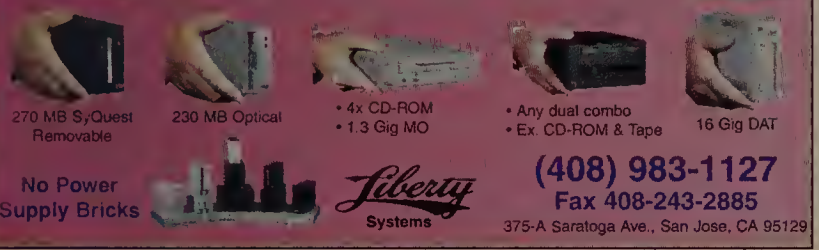

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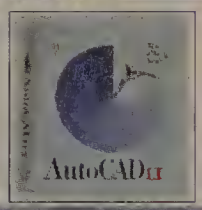

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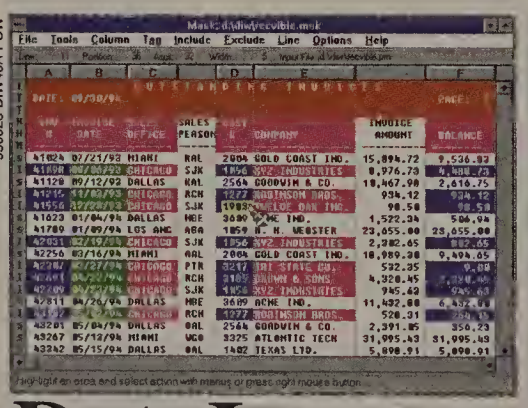

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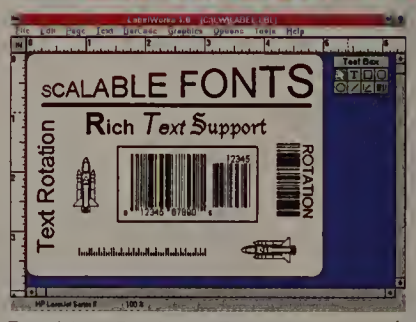

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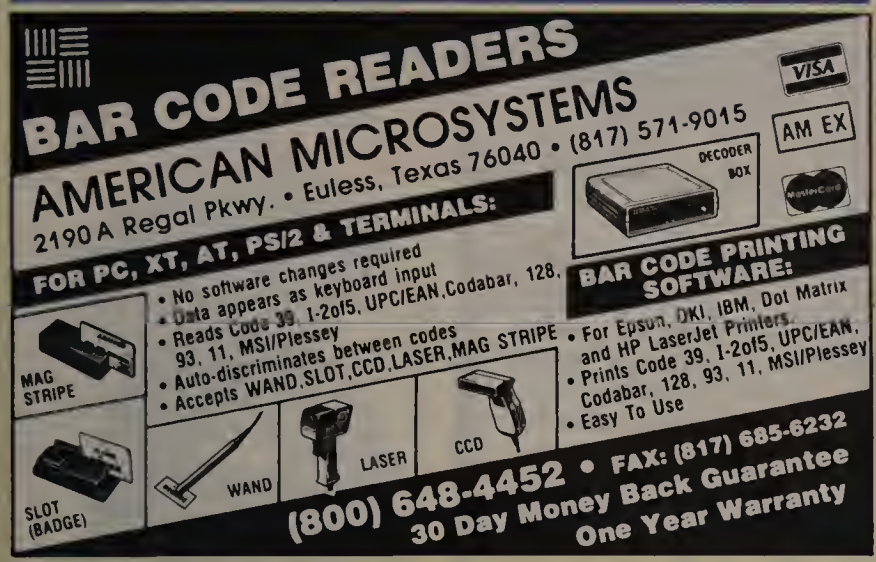

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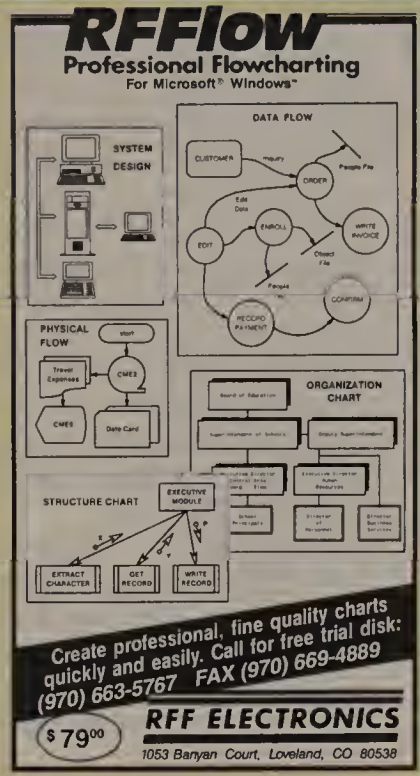

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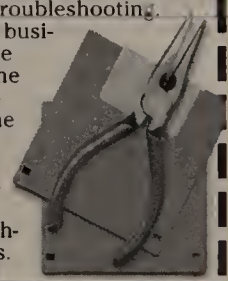

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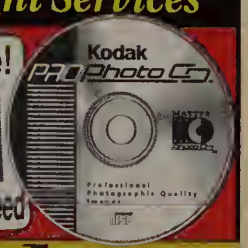

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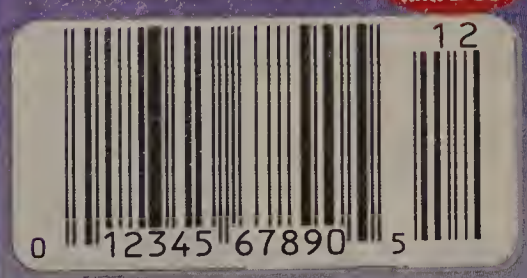

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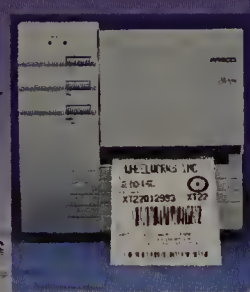

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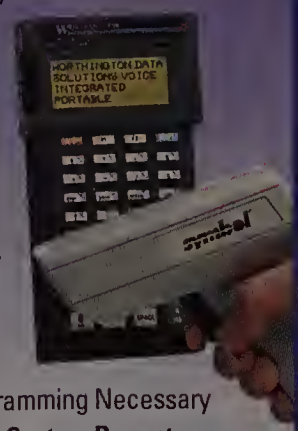

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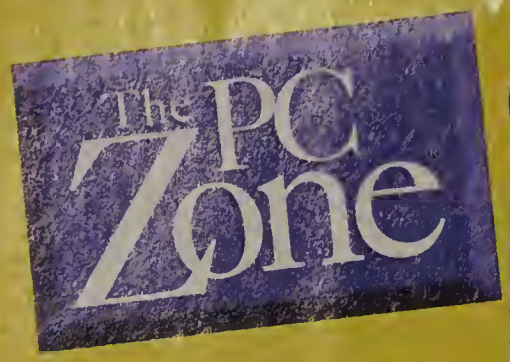

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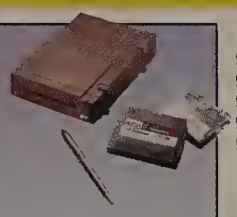

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07G1415/07G1420 (4Meg)	Thinkpad 750, C, 700, C, 720, C, CL57SX	189.00
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66G0095 (16Meg, 32Meg)	Thinkpad 750, C	629/1289
66G0094 (4Meg)	Thinkpad 755, 360, 355, 340, 450	179.00
66G0094 (8Meg)	Thinkpad 755, 360, 355, 340, 450	329.00
66G0094 (16Meg, 32Meg)	Thinkpad 755, 360, 355, 340, 450	629/1289
8189098 (4Meg)	Thinkpad 500, 510CS (3.3 volt)	179.00
8189099 (8Meg, 16Meg)	Thinkpad 500, 510CS (3.3 volt)	349/619
79F0999 (2Meg)	LX40, N33SX, PS Note	103.00
79F1000 (4Meg)	LX40, N33SX, PS Note, Tkpd 350, 350c, PS Note 425	189.00
79F1001 (8Meg)	LX40, N33SX, PS Note	349.00
Hard Drive (524Meg, 710 Meg, 1.3 Gig)	Thinkpad 750, 755, 360, 355	769/949/1119
(4Meg/16Meg)	Thinkpad 755 Dimm Modules	199/749
(4Meg/16 Meg w/Adap	Thinkpad 755	269/839
60G0378 (8Meg)	Thinkpad 350, 350c, PS Note 425	339.00
60G0379 (16Meg)	Thinkpad 350, 350c, PS Note 425	569.00
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92G7259 (4Meg)	Thinkpad 701C, CS, Butterfly	179.00
92G7261 (8Meg)	Thinkpad 701C, CS, Butterfly	369.00
92G7263 (16Meg)	Thinkpad 701C, CS, Butterfly	629.00
4Meg/8Meg/16Meg (73DT only)	Thinkpad 340, 730T	219/359/629
(4Meg, 8Meg, 16Meg)	Thinkpad 760	199/369/669
8Meg/16Meg	Thinkpad 820	390/729
4Meg/8Meg/16Meg/32Meg	Thinkpad 850	193/399/719/1439
4Meg/8Meg/16Meg/32Meg	PC300 Pentium	179/339/629/1259

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	1Meg Board/4Meg Board	149/279
Deskpro 386 25E/20E	1Meg Module/4Meg Module	79/199
	1Meg Board/ 4 Meg Board	149/279
Deskpro 386/25, 20	1Meg Module/4Meg Module	79/199
Deskpro System Pro 386/33, 486/25, 486/50L	2/8/32Meg	99/299/1399
Deskpro 4/66I, 4/33I, 4/25IS, 3?33I, 3/25I	2/4/8Meg	89/154/319
Deskpro "M" Series	Expansion Board OK	189
Deskpro 450, 466, 4100, 575, 590, 5120, 5133	4/8/16/32Meg	159, 319, 619, 1149
Deskpro XE 433S, 450, 466	2/4/8Meg	89/154/319
Deskpro XE 560	8/16/32/64/128Meg	356/616/1276/2476/Call
Deskpro XL450, 466, XL560, xl566, XL575, 5100 xl590	4/8/16/32/64Meg	178/308/638/1238/2378
Presario 433, CDS52D, CDJV52D, COL524, COS526, COTV528, 660, CDS66D, CDS720, CDS724, CDS744, COS860, CDS920, CDTV920, 924, CDS924, CDS954	4/8/16/32Meg	139/279/549/1049
Presario 400 Series, 600 Series, 800 Series	2/4/8/16/32Meg	89/154/319/649/1189
Presario CDS774, COS972, COS982, CDTV978, COS974 (in pairs), CDS992, 7152, 7170, 7180, 9546, 9548, 9564	4/8/16/32Meg	139/279/549/1099
Prolinea 4/25S, 4/33, 4/33S, 4/50, 4/66, CDS	1/2/4/8Meg	59/89/154/319
Prolinea MT 4/33S, 4/50, 4/66, Enhanced 4/33S, 4/50S, 4/50, 4/66	2/4/8/16/32 Meg	59/154/319/649/1189
Prolinea 45D, 466, 4100, 575, 590, 5120, 575, 590, 5120, 575 mini, 510D mini, 5133 mini	4/8/16/32Meg	154/319/649/1189
Proliant 1500 5/75, 5/100, 1500R 5/75, 5100 (Install in pairs)	4/8/16/32Meg	154/319/619/1189
Prosignia 300, 575, 590, 500 5/90, 500 5/120 (Install in pairs)	4/8/16/32Meg	154/319/619/1189
Proliant 1000 5/60, Prosignia 5/60	16/32/64/128/256	616/1276/2476/4756/Call
Proliant 2000 486/50, 5/66, 5/90, 2000R 5/66, 5/90, 4000 486/50, 5/66, 5/90, 5/100, 4000R 5/66, 5/90, 5/100, 4500 5/100, 4500R 5/100	16/32/64/128/256	616/1276/2476/4756/Call

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LTE LITE/20, 25, 25C	4Meg Module	129769-002	209.00
LTE LITE/20, 25, 25C	8Meg Module	129769-003	439.00
LTE LITE/20, 25, 25C	16Meg Module	129769-004	669.00
LTE LITE 425C/33C/25E/25L	4Meg Module	142337-002	189.00
LTE LITE 425C/33C/25E/25L	8Meg Module	142337-003	349.00
LTE LITE 425C/33C/25E/25L	16Meg Module	142337-004	619.00
SLT/286	4Meg Module	110237-001	179.00
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Contura 320, 325	2Meg	139497-001	99.00
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	8Meg	139499-001	339.00
Contura 400, 410	4Meg/8Meg/16Meg		179/359/619
Contura 420, 43D	4Meg/8Meg/16Meg/20Meg		179/359/619/799
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	179.00
	8Meg	146521-001	349.00
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T2100, 2105, 2150, 2155, 2110, 2115, 2130	4Meg/8Meg/16Meg/24 Meg		179/349/699/1079
T4400SX, SXC T6400, T6600	4Meg	PC-PA2004U	189.00
T4400SX, SXC T6400, T6600	8Meg	PC-PA2005U	379.00
T4400SX, SXC T6400, T6600	16Meg	PC-PA2010U	689.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	4Meg	PC-PA2012U	189.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	8Meg	PC-PA2D13U	349.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	16Meg	PC-PA2014U	852.00
T4700, 4800, 4850 (Hard Drive)	524Meg/710Meg/1.3 Gig		739/969/1119
T3400CT, T2400, T3600	4Meg/8Meg/16Meg	PC-PA2019U	179/349/819
T3400CT	32Meg		1549.00
T3100SX	2Meg	PC15-PA83D8U	109.00
T3100SX	4Meg	PC15-PA8310U	189.00
T5200/T8500	2Meg	PC10-PA8304U	49.00
T5200/T8500	8Meg	PC10-PA8313U	369.00
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T400CS, 400CDT	8Meg/16Meg/32Meg		469/849/Call

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ACER 73D, 735C, 760, 780	2Meg/4Meg/8Meg		109/179/359
ACER 763, 765, 782, 784, 786, 787,	4Meg/8Meg/16Meg		179/359/629
ACER 75D	4Meg/8Meg/16Meg		179/359/629
ALR Venture	4Meg	12407980	249.00
Altima Virage	4 Meg/ 16 Meg		199/679
Altima Virage II	4Meg/8Meg/18Meg		199/369/622
AST Advantage Adventurer 4066D, 6066D, 8066D	6Meg/16Meg/32Meg/64Meg		379/759/1249/2599
AST Ascentia 900N, 800N	4Meg/8Meg/16Meg		179/359/629
AST Ascentia 950	8Meg/16Meg		419/759
AST Bravo & Explorer	4Meg/16Meg	501255-001, -002	189/639
AST Bravo MS-L P90	8Meg/16Meg/32Meg/64Meg		379/759/1249/2599
AST Notebook Prem Exec 386SX/20/25/25L	4Meg	500814-003	179.00
AST Power Exec 3/25C, 425EL, 425SL	4Meg/16Meg	501166-001, -003	189/629
AST Power Exec 4/33SL	4Meg/16Meg	501318-001,002	194/679
AT&T Globalyst 130	4Meg/8Meg		179/679
AT&T Globalyst 200 *(Call for other Globalyst)*	4Meg/8Meg/16Meg		199/389/679
AT&T Safari NSX/20	4Meg	PEC 37651	259.00
Austin DX4, DX2, SX2, SX Series	4Meg/16Meg		199/699
Bondwell B310, Plus	1Meg	23050-09100	69.00
Bondwell B310V, SX	1Meg/4Meg		1D9/229
Canon Innova Book 150	4Meg/16Meg		179/639
Canon Innova Book 200LS	4Meg/8Meg/16Meg/24Meg		179/359/639/979
Canon Innova 486	2Meg/4Meg/8Meg		109/209/449
Canon Innova 486-10	4Meg/16Meg		189/639
Canon Notejet 486	4Meg/8Meg		199/389
Canon Notejet DX4/75	4Meg/8Meg/16Meg		189/379/629
Compuadd 425TX Notebook	4Meg/16Meg		199/699
DEC HiNote, Ultra HiNote	4Meg/8Meg/16Meg		199/379/669
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Dell Lattitude M, MC, MCX	4Meg/8Meg/16Meg		189/379/639
Dell Lattitude XP, 475, 4100, 4100CX	4Meg/16Meg		189/639
Dell Latitude 486, 425, 433C, 433CX, 450, 450CX	4 Meg/16 Meg		189/639
DTK 4T100P Notebook	4Meg/8Meg/16Meg		189/369/639
Epson ActionNote 650, 650c, 660c, 660cx	4Meg/8Meg/16Meg		179/359/639
Epson ActionNote 700, 700c, 700cx	4Meg/16Meg		199/639
Epson ActionNote 800, 880, 866c	4Meg/8Meg/16Meg/20Meg		179/359/679/799
Epson ActionNote 4000 Notebook	6Meg		279
Epson ActionNote 4LC/25, 4LC/33, 4SLC/2-50	6Meg		279
Everex Tempo LX, LX20, Carrier	2Meg	PCA 00053-0001	109.00
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Gateway 2000 Nomad 425 DXL/SXL	4Meg/16Meg		199/769
Gateway 2000 486 Handbook or Liberty	4Meg/16Meg		199/679
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HP Omnibook 530, 600	4Meg/8Meg/12Meg		189/359/529
HP Omnibook 4000	4Meg/8Meg/16Meg		199/379/649
HP Omnibook 5000	8Meg/16Meg/32Meg		329/639/1249
Leading Edge Aviva 2000	4Meg/16Meg		179/639
Lexmark SE10	4Meg/8Meg		179/349
Magnavox Metalis	1Meg/4Meg	286, 386SX	109/199
Midwest Micro Elite SX-25, SX33, DX2-50, DX2-66	4Meg/8Meg/16Meg		199/389/629
Midwest Micro Elite Sndbk SX33, DX3-50, DX4-75, DX4-100	4Meg/8Meg/16Meg		199/389/629
Midwest Micro Elite Sndbk Plus D5-75, D5-90	4Meg/8Meg/16Meg		199/389/629
NCR Safari 3180, 3181	4Meg/ 8 Meg		189/369
NEC Ultralite Versa, E, V, MP	4 Meg/8Meg/16Meg/20Meg	DP4104	183/359/619/799
NEC Versa Removable Hard Drive	540Meg/710Meg/810Meg/1.3 Gig		719/899/919/1159/1229
NEC Versa S	4Meg/8Meg/16Meg		179/359/629
NEC Versa 2000C & 2000D	4Meg/8Meg/16Meg		199/379/799
NEC Versa 4000	4/8/12/16/20/32Meg		199/379/549/669/899/1569
Packard Bell 386SX, 286	1Meg, 4Meg	286, 386SX	109/179
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Panasonic CF170, CF270, CF370	1Meg	CF-BA165	59.00
Panasonic CF38D, CF480	2Meg/4Meg/6Meg		119/199/309
Panasonic CF-V21P, CF-580	4Meg/16Meg		219/819
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Sanyo 17/18 NB	2Meg	MBC-NBMEM2	109.00
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Twinhead Slimnote 5	4Meg/8Meg/16Meg		199, 379, 649
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Canon LBP 430	–	–	69	–	–	–	167	–	–	–	–	–
Canon LBP 860	–	–	–	99	–	–	179	–	–	349	669	1249
Canon LBP4, 4Lite, 4plus	–	–	129	179	–	–	–	–	–	–	–	–
Epson 6000, Action Laser	–	–	–	129	–	–	229	–	–	–	–	–
Epson Action Laser 1100, 1600	–	–	69	99	–	–	169	–	–	379	599	–
Epson Action Laser II	–	–	89	–	2D8	–	–	327	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	–	–	89	–	208	–	–	327	–	Call	Call	Call
Epson 1000, 1500, 5000, 5200	–	–	–	***109***	–	–	***218***	–	–	–	–	–
HP 2, 2D–	–	–	–	89	–	–	179	–	–	–	–	–
HP 3, 3D, 3P, 2P 2P+	–	–	–	89	–	–	149	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX	–	–	–	89	–	–	149	–	–	349	–	–
HP 4P, 4PLUS, 4MPm 1600, 1600CM	–	–	–	–	–	–	145	–	–	289	–	–
HP 4L	–	–	59	–	–	–	–	–	–	–	–	–
HP 3SI	–	–	69	–	–	–	169	–	–	299	–	–
HP 4SI	–	–	–	89	–	–	155	–	–	299	–	–
HP 5L	–	–	69	129	–	–	219	–	–	399	–	–
HP 5P	–	–	–	89	–	–	155	–	–	305	539	–
HP Design Jet 600, 650, 200	–	–	–	89	–	–	167	–	–	349	–	–
HP Deskjet 500, 500C, 510, 550,560	–	49	–	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C, 1200C/P	–	–	–	89	–	–	167	–	–	349	–	–
HP Laserjet	–	–	–	–	–	–	179	–	–	379	679	–
HP Paintjet XL300	69	–	–	–	–	–	249	–	–	428	837	–
IBM Laser 4019, 4019E	–	–	–	–	–	169	–	–	–	–	–	–
IBM Laser 4029, 4037	–	–	–	–	–	–	169	–	–	–	–	–
IBM Laser 4039, 4079	–	–	–	99	–	–	169	–	–	350	–	–
Konica LP-3110	–	–	119	189	239	–	–	–	–	–	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	–	–	–	139	–	–	339	639	1149
Lexmark Valuwriter 300,600	–	–	59	89	–	–	169	–	–	–	–	–
Lexmark Winwriter 200, 400, 600	–	–	59	89	–	–	169	–	–	–	–	–
NEC 90, 290	–	–	–	119	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	99	–	–	–	–	–	–	–	–
Dki 400	–	–	–	104	169	–	219	–	–	–	–	–
Dki 400E, 4DDEX, 41DE, 41DEX	–	–	89	129	–	–	–	–	–	–	–	–
Dki 83D, 84D	–	–	–	1D9	–	–	–	–	–	–	–	–
Packard Bell PB 950D	–	–	–	139	–	–	227	–	–	–	–	–
Packard Bell 9815	–	–	–	139	–	–	229	–	–	–	–	–
Panasonic 442D/445DI	–	–	–	129	–	–	229	–	–	–	–	–
Panasonic 4410/443D	–	–	–	126	–	–	195	–	–	–	–	–
Panasonic 445D	–	–	99	–	–	–	–	–	–	–	–	–
Panasonic 4400/54DD	–	–	89	129	–	–	229	–	–	–	–	–
Panasonic 4440, 5410	–	–	89	129	–	–	229	–	–	–	–	–
Sharp 94DD, 946D, 96DD, 97DDE	–	–	89	129	–	–	229	–	–	–	–	–
Sharp 95DD, E, H, 9700, H	–	–	79	–	–	–	259	–	–	–	–	–
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Minitower	Pentium 75	1GB	$1799
Minitower	Pentium 100	1GB	2099
Minitower	Pentium 100	1.6GB	2499*
Minitower	Pentium 120	1.6GB	2799*
Minitower	Pentium 133	1.6GB	2999*

Monitors priced seporately **16MB RAM standard*

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Advantage Adventure Multimedia (4X or 6X CD-ROM)

- 6X CD-ROM Drive (selected models only)
- Advanced Telephony – 28.8 data/fax/modem, telephone answering system, and speaker phone (differs by model, call for details)
- Integrated 3-D surround sound
- 3DR graphics (selected models only)
- AST Works II navigation software – featuring "SPOT"
- 3 disc CD changer (selected models only)
- MPEG software support

All New Models!

Chassis	Processor	HD	Price
Desktop	Pentium 75	850MB	$1450*
Desktop	Pentium 100	1.2GB	1750
Desktop	Pentium 133	1.2GB	1950
Minitower	Pentium 100	1.2GB	1950
Minitower	Pentium 133	1.6GB	2330
Minitower	Pentium 150	2.1GB	2920**
Minitower	Pentium 166	2.1GB	3200**

**4X CD-ROM*
*** 3DR graphics*
Monitors priced separately

WIN95 INSTALLED

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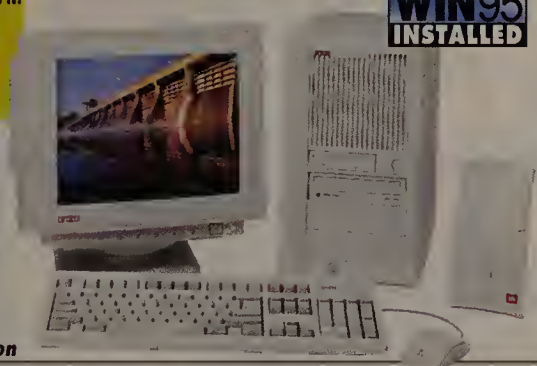
High-Fidelity JBL Speakers



Digital Starion

WIN95 INSTALLED

Digital Starion
NEW! Windows 95 Multimedia Computers

- Quad Speed CD-ROM Drive
- Up to Pentium 133 - fastest Pentium available!
- PCI local bus – high speed graphics
- Unbelievable sound - SoundBlaster Pro-compatible, SW WaveTable, Premium JBL speaker system
- 28.8 fax modem with advanced telephony features. (differs by model)
- Loads of **FREE** software preinstalled

All New Models!

Chassis	Processor	HD	Price
Minitower (911)	Pentium 75	1.2GB	$1799
Minitower (917)	Pentium 100	1.2GB	1999
Minitower (922)	Pentium 75	1.2GB	2199*
Minitower (931)	Pentium 100	1.6GB	2499*
Minitower (932)	Pentium 120	1.2GB	2599*
Minitower (933)	Pentium 120	1.6GB	2699*
Minitower (940)	Pentium 133	1.2GB	2799*
Minitower (2001)	Pentium 133	1.6GB	3099*

Monitors priced separately **16MB RAM standard*

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FREE! Lotus SmartSuite 4.0 $399.99 value With your Aptiva purchase

Aptiva® Multimedia

- Quad Speed CD-ROM Drive
- 16-bit stereo sound - SoundBlaster Compatible
- Advanced Telephony - 28.8 fax/modem, full duplex speaker phone, answering machine & voice mail
- 30 Watt stereo speakers
- Built-in MPEG support for full screen, full motion video
- Over 40 **FREE** software titles

WIN95 INSTALLED

Chassis	Processor	HD	Price
Minitower	Pentium 100	1.6GB	$2299
Minitower	Pentium 120	1.6GB	2399
Minitower	Pentium 100	1.6GB	2599*
Minitower	Pentium 133	1.6GB	2899*

**16MB RAM standard*
Monitors priced separately

intel inside

HEWLETT® PACKARD

NEW!

HP DeskJet 340 $289.99

HP LaserJet Printers

HP LaserJet 5P printer (IBM, 6ppm, 600dpi)	$879.99
HP LaserJet 5L printer (IBM, 4ppm, 600dpi)	479.00

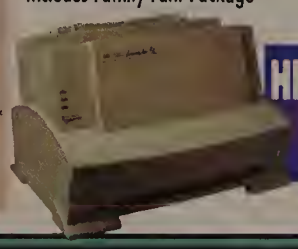
HP InkJet Printers

HP DeskJet 340 printer (portable)	$289.99
HP DeskJet 600 printer	289.99
HP DeskJet 600C printer	299.00
HP DeskJet 660C printer	389.99
HP DeskJet 660Cse printer	399.00*
HP DeskJet 855C printer	499.00
HP DeskJet 1600C printer	1349.99

Home Office Products

HP OfficeJet	$599.99
HP OfficeJet LX	689.99
HP FAX-700	549.99

*Includes Family Fant Package



HP LaserJet 5L $479.00

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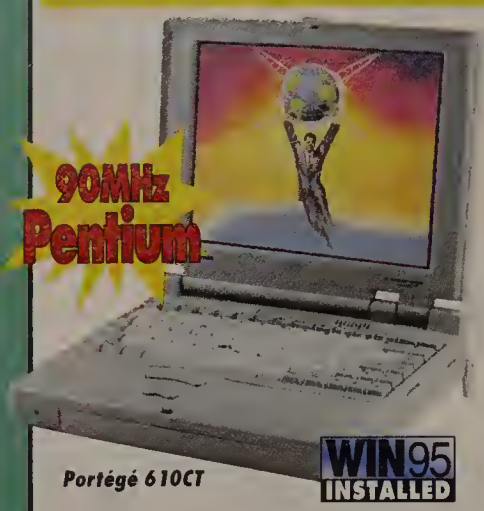


Portégé 610CT

Tecra 700

120MHz Pentium with PCI bus

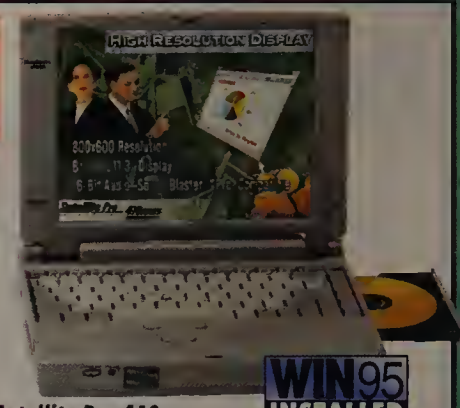
WIN95 INSTALLED

- Pentium 120MHz processor – fastest available on a notebook!
- PCI bus architecture (internal & external)
- 11.3", 800x600 high resolution displays
- Optional 4X CD-ROM Drive (swap floppy & CD-ROM)
- Multimedia docking station with PCI bus (optional accessory, priced separately)
- Built-in 16-bit sound, microphone, **2 speakers** & MIDI
- **HUGE**, 1.13GB hard drives

Processor	Screen	HD	Price
Pentium 120	11.3" Dual Scan	1.13GB	$4679
Pentium 120	11.3" Active	1.13GB	5949

Tecra 700

BIG! 11.3" Screens



Satellite Pro 410

Satellite Pro 400 & Satellite Pro 410

- Built-in 4X CD-ROM Drive (Swap floppy & CD-ROM) (Active models only - optional on Dual Scan)
- Built-in 16-bit sound, microphone, speaker & MIDI
- EDO RAM memory, exp. to 40MB (Sat. Pro 410 only)
- Built-in AC adapter - small, sleek design & reduced weight
- Integrated Accupoint - small, accurate & easy to use
- Lithium Ion battery technology
- Built-in infrared for wireless communications

Satellite Pro 400

Processor	Screen	HD	Price
Pentium 75	10.4" Dual Scan	772MB	$2899
Pentium 75	10.4" Active	772MB	3999

Satellite Pro 410

Processor	Screen	HD	Price
Pentium 90	11.3" Dual Scan	772MB	$3499
Pentium 90	11.3" Active	772MB	4679

Portégé 610CT

- Pentium 90MHz processor
- 9.5" True Color display for optimum color
- Built-in 16-bit sound (SoundBlaster Pro compatible), microphone & speaker
- Lithium Ion battery technology
- Accupoint stick for easy control

Processor	Screen	HD	Price
Pentium 90MHz	9.5" True Color	720MB	$3939

Satellite 2110/2130

Satellite 2110/2130

Processor	Screen	HD	Price
4B6DX4/75	10.4" Dual Scan	330MB	$1679
4B6DX4/75	10.4" Dual Scan	500MB	1969
4B6DX4/75	10.4" Active	500MB	2499

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ThinkPad® 365CD

ThinkPad® 365

- 10.4" Active & 10.4" Dual Scan
- Built-in infrared for no-hassle printer connections
- Multimedia models include built-in 2X CD-ROM, SoundBlaster compatible audio, speaker, microphone & MIDI/joystick port
- MS Windows 95 or Selecta System models available

Processor	Screen	HD	Price
4B6DX4/75	10.4" Dual Scan	540MB	$1999
4B6DX4/75	10.4" Active	540MB	2599
4B6DX4/75	10.4" Dual Scan	540MB	2499*
4B6DX4/75	10.4" Active	540MB	3099*

*Multimedia Models

ThinkPad® 760

- Pentium 90 & 120Mhz with 32-bit local bus
- 12.1" Active displays with 800x600 resolution (selected models)
- 4X CD-ROM Drive, MPEG-2 support, & full motion video (ThinkPad760CD only *)
- Built-in 28.8 fax/modem
- SoundBlaster-compatible audio & telephony
- Lithium Ion battery technology

Processor	Screen	HD	Price
Pentium 90	10.4" Active	720MB	$5349
Pentium 90	12.1" Active	720MB	6049
Pentium 120	12.1" Active	720MB	6599
Pentium 90	12.1" Active	1.2GB	7449*

*Features built-in CD-ROM drive
WIN 95 models available. Call for details.

ThinkPad® 760

NEC

Versa 2000

Processor	Screen	HD	Price
4B6DX4/75	9.5" Active	350MB	$2099*
486DX4/75	9.5" Active	350MB	2399
4B6DX4/75	9.5" Active	540MB	2599

*14.4 fax/modem not built-in

NEC Versa 4000

NEC Versa 4000

- Built-in CD-ROM Drive! (Standard on some models, optional on others)
- Pentium 75 and Pentium 90 processors
- 256KB Level 2 Cache to optimize performance
- Unbelievable displays – 65K color Dual Scan, 16.8 million color Active (High resolution Active Matrix displays available – 800x600 res.)
- Built-in 16-bit sound, microphone, MIDI and **2 built-in speakers**
- Multimedia docking station with outstanding Altec Lansing 4 speaker array (optional accessory, priced separately)

Processor	Screen	HD	Price
Pentium 75	10.4" Dual Scan	540MB	$3499
Pentium 75	10.4" Dual Scan	540MB	3799*
Pentium 75	10.1" Active	540MB	3999
Pentium 90	10.1" Active	810MB	4649*
Pentium 90	10.4" High Res.	810MB	4799

*Features built-in CD-ROM drive

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HiNote Ultra

- All models 4 lbs. or less - **ONLY 1.2" thick**
- Built-in sound, microphone & speaker
- Lithium Ion battery technology
- Built-in infrared
- 3-year warranty - **FREE** 1-year Passport Service

Processor	Screen	HD	Price
486DX2/50	9.5" Dual Scan	340MB	$2549
4B6DX2/50	9.5" Active	340MB	3079
4B6DX4/75	9.5" Active	340MB	3319
4B6DX4/75	9.5" Dual Scan	528MB	3079
4B6DX4/75	9.5" Active	52BMB	3639

Complete lines of Digital Desktop & Server PCs available. Call for details and pricing.

COMPAQ

Contura 420/430

Processor	Screen	HD	Price
486DX4/75	10.4" Dual Scan	420MB	$20B9
4B6DX4/75	10.4" Active	420MB	2559
486DX4/100	10.4" Dual Scan	720MB	2369
4B6DX4/100	10.4" Active	720MB	2939

LTE 5000 Series

- Up to 120MHz Pentium power w/PCI bus & 256KB cache
- 32-bit PCI Local bus graphics
- 8MB RAM exp. to 72MB
- Built-in 16-bit sound, microphone & **2 speakers**
- MultiBay – holds CD-ROM, 2nd HDD, Floppy, or 2nd battery.
- Up to 1.35GB hard drives (2.7GB max. capacity)
- Built-in infrared for wireless communications
- Supports NiMH & Lithium Ion batteries (up to 8 hrs.)
- Optional MPEG and TV video adapter

Processor	Screen	HD	Price
Pentium 75	10.4" Dual Scan	510MB	$3799
Pentium 75	11.3" Dual Scan	B10MB	4439
Pentium 75	10.4" Active	810MB	4729
Pentium 90	10.4" Active	B10MB	5339
Pentium 90	10.4" Active	B10MB	5599*
Pentium 120	10.4" Active	1.35GB	6149

**Features Built-In CD-ROM drive*

WIN95 INSTALLED

LTE 5000

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AST Explorer NEW!

- Built-in SoundBlaster sound, speakers & microphone
- 10.4" Active matrix display
- Full-size 84-key, 3mm travel keyboard
- 32-bit Local Bus

Processor	Screen	HD	Price
486DX4/100	10.4" Active	510MB	$2099

UP TO 120MHz PENTIUM

Ascentia 950N

Ascentia 950N

- Up to 120MHz Pentium - for blazing performance
- High Res. displays - 800x600 res. on notebook
- Built-in 16-bit sound, microphone & speaker
- Lithium Ion battery technology
- Built-in infrared for no-hassle printer connections

Processor	Screen	HD	Price
Pentium 75	10.4" Active	B00MB	$3069
Pentium 75	10.4" Active	1.2GB	3449
Pentium 90	10.4" Active	800MB	4199
Pentium 90	10.4" Active	1.2GB	4579
Pentium 120	11.8" Active	800MB	4919
Pentium 120	11.B" Active	1.2GB	5199

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TEXAS INSTRUMENTS

TravelMate 5200

- Pentium 120MHz w/PCI bus
- 10.4" Active Matrix
- 1.2GB Hard Drive

NEW!

Only $5099

Extensa 550/550CD

- 75MHz Pentium w/PCI bus & 256KB cache
- Built-in 2X CD-ROM drive (optional on some models)
- Built-in 16-bit sound, microphone & speaker (optional on some models)
- Integrated touchpad pointer
- 10.4" Active Matrix & 10.4" Dual Scan
- Built-in infrared for wireless communications

Extensa 550 as low as **$2449***

NEW!

Processor	Screen	HD	Price
Pentium 75	10.4" Dual Scan	524MB	$2449*
Pentium 75	10.4" Dual Scan	524MB	2939
Pentium 75	10.4" Active	524MB	3519

*CD-ROM Drive and sound system is an optional accessory on this model.

75MHz Pentium with PCI BUS

Extensa 550CD

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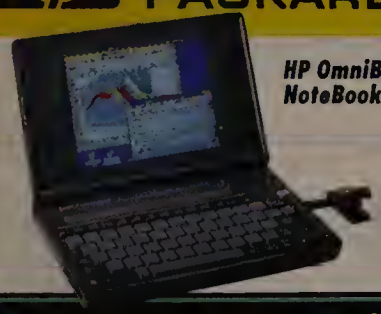


HP OmniBook 600 NoteBook PC

HP OmniBook 600

- Weighs **ONLY 3.8 pounds!**
- Built-in 16-bit sound, microphone & speaker (active model only)
- Built-in infrared for no-hassle printer connections
- Lithium Ion battery technology (active model only)
- Instant "ON" ready-to-work state – lasts for months on a charge

Processor	Screen	HD	Price
4B6DX4/75	9.5" Active	260MB	$2759
486DX4/75	9.5" Active	340MB	2999

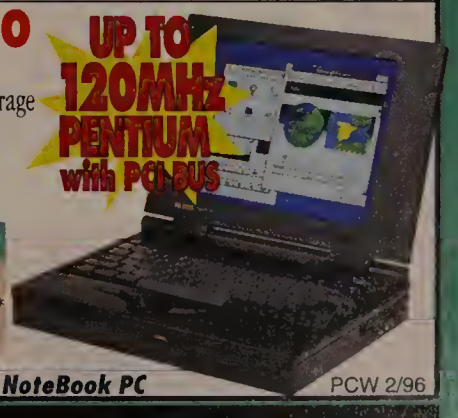
HP OmniBook 5000

- Pentium 90MHz with 32-bit PCI Local bus
- 1.2GB drives available for high capacity storage
- High resolution – 800x600 resolution on notebook display
- Built-in 16-bit sound, microphone & speaker

Processor	Screen	HD	Price
Pentium 90	10.4" Active	1.2GB	$5329
Pentium 90	10.4" Active	1.2GB	58B9*
Pentium 120	10.4" Active	1.2GB	6539

**16MB RAM standard*

UP TO 120MHz PENTIUM with PCI BUS



HP OmniBook 5000 NoteBook PC

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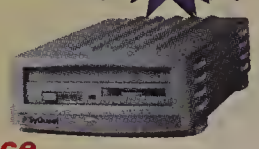
SyQuest

Includes data cartridge



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External SCSI .... **$239.49** CDW 55471
External parallel ..... **CALL!**

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V.34 and V.FC!

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Maximum performance, maximum value

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ACCURA 144+ FAX144, external ..... **$108.91** CDW 27349

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DX1795, 17" color monitor **$775.16** CDW 62088

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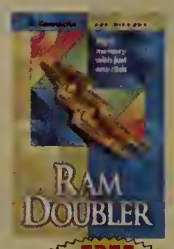

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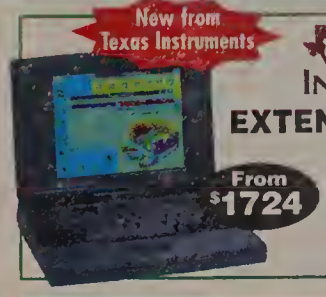

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958 Printers
959 Multimedia products
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961 Mail order companies
962 Storage devices

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Consumer Watch

Windows 95: Take Two Aspirin...

BY ROBERTA FURGER

I wasn't planning to install Windows 95 at home—not until I got a new PC. My 486 meets Microsoft's recommended configuration, but I was hardly thrilled with the idea of having the program on an old system.

Then I started hearing about several new Windows 95–only CD-ROMs—titles I knew my family would enjoy. What the heck, I decided. Why not take the plunge? I'd already installed Windows 95 on my office PC, and it had gone flawlessly.

DAY 1

It's 9 o'clock on a Sunday evening. The kids are in bed, and the house is quiet. I set to work. An opening screen says the install takes 30 to 60 minutes. Great, I think. I'll finish the upgrade and still be in bed by 11.

I choose the Custom installation option. Things are going nicely until a decidedly unhelpful error message pops up: 'Windows has detected a previously installed device (Ndis 2 driver) with an incompatible driver. Contact your hardware manufacturer for a Windows 95 compliant driver. This device has been removed'. That's it. No details on what was removed or what the consequences would be. The only option is to click OK and continue.

9:40 p.m. I finish the installation without any more scary error messages, and figure I've hit the homestretch when the screen reads, 'Preparing to run Windows 95 for the first time'. I can hear Mr. Sandman calling my name. And then, it happens. My second error message—the one that will take nearly three days to solve—'MSGSRV32: This program has performed an illegal operation and will be shut down. If the problem persists, contact the program vendor'. I click the Details button and get a bunch of numeric codes only a programmer could understand. I dutifully copy down each line, figuring tech support could decipher the code and tell me what to do.

By now it's 10 p.m. I call Microsoft and discover standard tech support is available only Monday through Friday between 6 a.m. and 6 p.m. Hey! This is a consumer product. How many consumers are home during those hours? I have two choices: Call a 900 line, or call a toll-free line and have my credit card billed by the minute. Either way, the cost is $1.95 per minute, with a cap of $35 per incident.

I opt for the 900 line and connect with Mike. He works for Unisys, one of Microsoft's Windows 95 support partners. Although I'd taken copious notes about the error messages, Mike doesn't seem interested. And he doesn't, to my surprise, ask anything about my computer. After putting me on hold to confer with colleagues, Mike asks me to read my config.sys and autoexec.bat files. He then says he has some ideas to research and asks if he can call me back in half an hour. It's 10:30 and my hopes of an early night have vanished, so I say okay.

Half an hour later Mike calls back. "By any chance do you have a Toshiba laptop?" he asks hopefully. No, I say, staring at my Compudyne desktop PC. He seems disappointed but goes on to suggest some possible fixes, including renaming my autoexec.bat and config.sys files. Nothing works,

PHOTO ILLUSTRATIONS: WILLIAM DUKE

so I start asking questions: "Could the problem be related to the error message about an Ndis 2 driver?"

By this point, Mike is getting perturbed, and so am I. He recommends I run the uninstall program on the Startup Disk, then try reinstalling the program.

12:12 a.m. The uninstall is finished and so am I. I go to bed.

DAY 2

5 a.m. Coffee in hand, I start the installation again. The Ndis 2 error message pops up, but I keep going. I make it to the end, then get good old MSGSRV32. I turn off my computer, get ready for work, and plan to come home early to call tech support.

3:40 p.m. I decide to call Microsoft's standard tech support line. I wasn't thrilled with Mike-of-Unisys's advice, and I didn't want to blow another $35 on the 900 line. The entire tech support staff supposedly has access to the same database, so I figure it doesn't matter which line I call. I talk to Mark, who suggests I call back on the 900 line. "You can't be charged any more, since it's the same incident," he notes. "Plus, you'll get priority service."

4:30 p.m. I call the 900 line and speak to Paul, from Digital, who doesn't realize he can access a summary of my previous call. "I'll have to check this out," he says. Unfortunately, Mike password-protected his notes, so Paul can't read them. I summarize what's happened and then proceed to read him every line in MSGSRV32. (I also tell him not to charge me for the call.) He puts me on hold to research a few things.

When he comes back, Paul has me read my config.sys and autoexec.bat files. We remove the files related to Netscape and reboot. The problem persists. So Paul suggests I try to run Windows in Safe mode. If that doesn't work, I should call back.

DAY 3

8:45 a.m. Running in Safe mode doesn't work, so I call the 900 line again. I get Tom, who works for a regional support center in the Midwest. (He isn't allowed to tell me the company's name.) Again we rename a bunch of the system files. When none of this works, Tom says he needs to research the problem and promises to call me back.

Meanwhile, I decide to try CompUSA's Technical Help line. Calls cost a hefty $2.45 a minute, but I'm going on three days without a computer now, and am willing to try anything. I talk to Wayne, who says it's impossible to determine the cause of the problem without uninstalling Windows 95 and then reinstalling it in a new directory. Of course, most of my applications would have to be reinstalled too. "It's not going to be easy, and it's not going to be fun," he warns. For this I'm paying $2.45 a minute?

Just as I'm getting ready to start the uninstall process again, Tom calls back. He suggests renaming system.ini and trying to start Windows 95 again in Safe mode. This time it works. "I think we can reinstall Windows from DOS," he says. So that's what we do—and he stays on the phone for the next two and a half hours until I finally get Windows 95 running.

EPILOGUE

It took me 14 hours over three days to install Windows 95. At times I was ready to chuck the upgrade, but I'm glad I persevered. Applications launch quicker, and printing times have been cut in half.

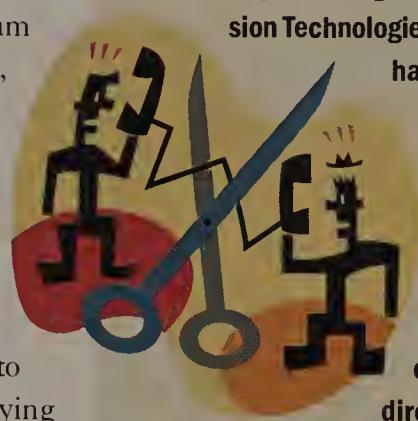
Michael Ahern, a Windows 95 product manager, assures me my experience was unusual. I do try a lot of prerelease software that could wreak havoc with a PC. But my experience with tech support was instructive. By the time I got to my third support person, I was taking charge of the call and asking lots of questions.

In the end, getting technical support is like going to the doctor. It's expensive, and you may not get your problem solved right away. To get the most from the experts, you need to arm yourself with information and be dogged about asking questions.

As always, you can contact Consumer Watch *with questions or problems. See page 14 for contact information.*

Feedback

Divesting Consumers



Tom Unruh of Rowland Heights, California, and others report that getting through to Media Vision Technologies in Fremont, California, had become impossible. Unruh called the company in September for technical support and found that all of the numbers listed in his user manual had been disconnected. Through directory assistance, he found another number for the company, but his messages went unanswered. Finally he gave up and wrote us that he thought the company had gone out of business. We contacted Media Vision and discovered a less drastic reason for the breakdown in communication.

In August 1995 the company announced it was divesting its retail products division to focus on its semiconductor business. The firm then hired SEI in Oregon to handle technical support for Media Vision retail products. The transition did not go smoothly. SEI didn't have enough phone lines or staff to handle the volume of calls, and there were a few days when none of the new customer service or technical support phone numbers worked. SEI is in the process of upgrading its facility. A Media Vision spokesperson claims that things will be running smoothly by the time you read this. The correct phone numbers to use are 800/638-2807 (customer service) and 503/882-1177 (technical support).

TAKE NOTE: **Do you get all the answers right on *Jeopardy!?* The creator of the TV show brings you a new challenge: the real-time online game Strike-A-Match. On America Online at keyword boxerjam.**

Off-the-Mark Service

E. M. Fountain Jr. of Houston, Texas, wrote recently to vent his frustration with The Microsoft Network. The service is slow, he says, and subject to frequent connection problems. In addition to these technical difficulties, the information the service provides isn't current. He cites

TOP: MICHAEL BARTALOS; RIGHT: JAMES F. KRAUS

Cybertoys for Everyone in the House

Color dreams, the Cold War, home repair

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DREAM IN COLOR

The future of home printers just got a little brighter with the introduction of the Hewlett-Packard DeskJet 660Cse. It's easy on the wallet, a snap to set up, and delivers brilliant color documents that rival the output of more expensive ink jets. It distinguishes itself from the rest of the pack by including a home printing kit with a free copy of Print Shop Deluxe; a collection of fun fonts; a Kodak Photo CD development offer; and a paper pack that includes greeting-card stock. In our printing speed tests, the 660Cse was a little slower than average, but it also won't take up much room on your desk. —*Angela Freeman*

- **Hewlett-Packard DeskJet 660Cse** $399 street; Hewlett-Packard; 800/752-0900. Grade: A

  Reader service no. 680

SPACE LACKS DRAMA

Maybe it's the dry British perspective of this CD-ROM's developer (the London-based First Information Group) or the "objective" portrayal of the Cold War tensions underlying the battle between the Soviet and American superpowers, but—for all its many laudable qualities—The Space Race flattens the emotional peaks that made its subject so gripping during its heyday. Despite the eye-pleasing presentation, I was left hankering for some variation in the melting-collage presentation and for full-screen enlargements of the stunning images of rocket launches, space walks, interplanetary exploration, and recent shuttle and space station advances. This minimally interactive documentary abounds with enough facts, fascinating footnotes (accessible through a shifting panel of icons), and rare film from Soviet archives to transcend its basic textbook approach—but not to eclipse the drama of a top-flight television special. —*Derk Richardson*

- **The Space Race** $69.95; FlagTower; 800/342-8000, 617/338-8720. Grade: B

  Reader service no. 681

POWER NESTING

If you don't know a soffit from a head jamb, you'll appreciate Home Improvement 1-2-3 from the folks at Home Depot. Despite some hopelessly hokey video clips introducing each of the 12 chapters (Floors, Electrical, Painting & Staining, and so on), the disc does a decent job explaining basic techniques, tools, and terminology and even offers a "Skill Scale," complete with estimates of how long it will take to finish a task. The interface is inventive, with step-by-step instructions on more prosaic do-it-yourself ventures like installing attic insulation or fixing a drain. For

PHOTO: PIERRE-YVES GOAVEC; ICONS: JOHN HERSEY; ILLUSTRATIONS: TOP, JAMES F. KRAUS; RIGHT: MICHAEL BARTALOS

its lack of up-to-the-minute stock quotes and its out-of-date news and weather reports. "CompuServe, AOL, and Prodigy have it together," says Fountain. "When will The Microsoft Network make it to the party?" Soon, according to a Microsoft spokesperson we contacted. In early 1996 MSN will begin offering stock quotes every 15 minutes, as the other commercial online services do (postings now occur daily). News and weather reports, currently updated several times a day, are also on the mend. Soon after you read this, Microsoft reportedly will begin using a new publishing tool to update news and weather. So stay tuned. And let us know what you think of the revised Microsoft Network.

TAKE NOTE: A recent PC user survey reveals a new generation gap. Ninety-two percent of kids under 12 play computer games. Only 52 percent of senior citizens do.

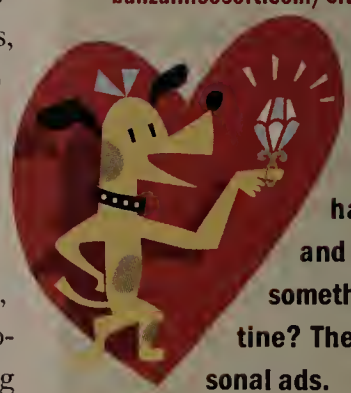
Source: Packard Bell's 1995 Home PC User Survey of 1700 respondents who bought a Packard Bell in the past year.

Don't Stop for Directions

If you or someone you know refuses to stop for directions—even when desperately lost (guys, you know who you are)—a new CompuServe service can help. Way to Go CompuServe gives you turn-by-turn driving instructions to any point of interest or to a street address. It has a listing of restaurants, hotels, shopping centers, convention centers—even ATMs and gas stations. You type in where you are and where you want to go, and CompuServe provides directions on how to get there. If you get lost, you can always blame it on the information superhighway.

Virtual Valentine

Who says nerds don't need love? This Valentine's Day, check out Cupid's Cove at http://banzai.neosoft.com/citylink/cupid. You can send your love a valentine, chocolate, roses, even diamonds. Even if the one who stole your heart has four legs, a wet nose, and a bark to die for, there's something for you here. No Valentine? Then check out Cupid's personal ads.



By Christina Wood

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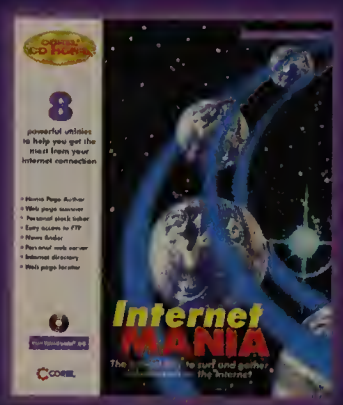
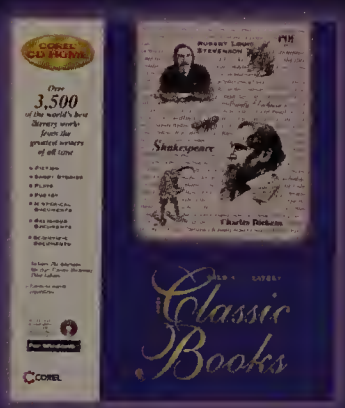


INTERNET MANIA
The easiest way to surf and gather information on the Internet

BERNARD OF HOLLYWOOD'S MARILYN
A multimedia journey through the life of Marilyn Monroe



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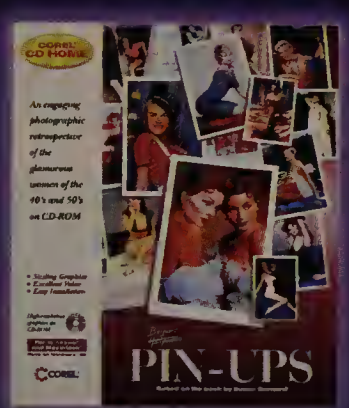

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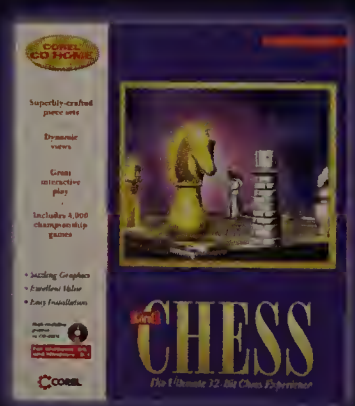

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tougher chores, you'll probably want to hit a book, or better yet, grab some couch and hire an expert. —*Steve Fox*

- **Home Improvement 1-2-3** $44.95 (CD-ROM only) or $54.95 with book; Multicom Publishing; 800/850-7272. Grade: B

Reader service no. 682

BETTY'S SO-CALLED LIFE

Many Americans have come to regard Betty Crocker as a national hero, forgetting that she is the made-up face of a giant food conglomerate. "Betty's" best cookery is the wholesome cuisine of corporate dietitians. This CD-ROM, however, includes hideous forays into "international" food, all gruesomely Midwesternized past any resemblance to authenticity.

Betty's disc includes techniques, tips, nutrition data, and 1000 recipes that are scalable to feed 1 to 99 people. But a half-baked search engine can't find recipes entered by name. One sentimental feature is a scrapbook of Betty's so-called life. Another feature, for new or inept cooks, is Cooking With Confidence. They shouldn't get *too* confident, though: This is one sloppy disc. Recipe directions may start in mid-process, and some are ambiguous enough to endanger dinner. Maybe Bett was sampling the cooking sherry when she programmed the disc? —*Naomi Wise*

- **Betty Crocker's Cookbook** $39.95; Lifestyle Software Group; 800/289-1157, 904/825-0220. Grade: D

Reader service no. 683

ARMED TO BUY

Looking to buy a car but don't know where to start? Before you run to your friendly local car salesman, check out Popular Mechanics Car Guide 1996. This comprehensive database of over 7500 new and used cars and trucks supplies you with necessary information: dealer prices for new cars, used car values, buying advice, a glossary of automotive terms, and video or photos. Don't know the model you want and can afford? Search the database by about 50 categories, including price, model, and year. Once you've found your dream machine, calculate loans, leases, and fuel costs. This disc is a perfect way to arm yourself with the information that you need when haggling with dealers. —*Arden M. Hoffman*

- **Popular Mechanics Car Guide 1996** $49.95; Books That Work; 800/242-4546. Grade: A

Reader service no. 684

EAT, DRINK, AND BE MERRY

Move over, Julia Child, a new cyberchef's in town! Dom DeLuise, comedian and cookbook author, brings nearly 200 recipes to life with this new two-disc CD-ROM. Over two hours of video and audio clips illustrate Dom's favorite dishes, plus some tips you'll never forget, like using a shower cap as a bowl cover, or turning your CD-ROM tray into a juicer. The mostly Italian recipes are delicious and easy to follow—most of them are even healthy. Chef de cuisine he's not, but DeLuise serves up the best of home cooking, with an extra helping of personality. —*Angela Freeman*

- **Cooking With Dom DeLuise** $49.95; Allegro New Media; 800/424-1992, 201/808-1992. Grade: A

Reader service no. 685

ESPAÑOL, ANYONE?

How often have you decided to learn another language? If you want to do something about it, try Who Is Oscar Lake? It's a tutorial disguised as a problem-solving adventure game. The first version teaches Spanish. In the game, you're a diamond dealer in Mexico City wrongfully accused of a museum heist. To gather clues to prove your innocence, you must explore the city and talk (in Spanish) to as many people as possible. A mouse click on an object provides you with its Spanish name, and the recording feature lets you listen to how you sound to improve your pronunciation. You set your own pace with 35 learning exercises based on real-life situations, and translations, transcriptions, and a glossary are readily available. Even if you solve the mystery, you probably won't become a fluent speaker. But you will have a solid introduction to the language. —*Angela Freeman*

- **Who Is Oscar Lake?** $49.99 street; Language Publications Interactive, Inc.; 800/882-6700. Grade: A

Reader service no. 686

Dom DeLuise makes cooking a blast.

STING BYTES

If rock troubadour Peter Gabriel could create a visionary CD-ROM about his life, Sting can do it with more panache. And so he has. This two-disc set pours on hours of video interviews and newly recorded performances. The discs' universe is a beautiful landscape. Click on doors, windows, and talismans, and journey to a different stage of the musician-actor's career. The video clips of his performances on stage and screen are engaging for fan and nonfan alike. But after awhile, his pontifications on his "art" and his feelings seem solipsistic. And the scavenger hunt for the tarot cards needed to unlock a performance of his new song—found only on this disc—quickly gets tiring. If you're a fan, the content may be compelling enough to make you tolerate the excesses of ego. —*Michael S. Lasky*

- **All This Time by Sting** $50; Starwave; 800/457-8646, 206/957-2000. Grade: B+

Reader service no. 687

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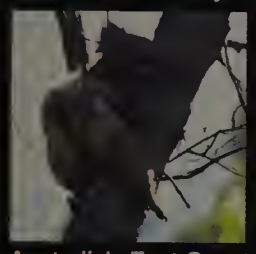
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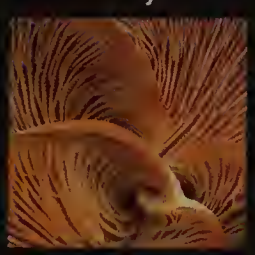
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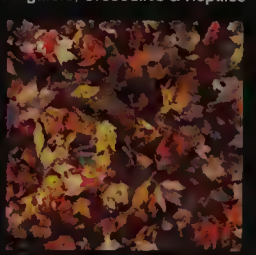
Contemporary Fabric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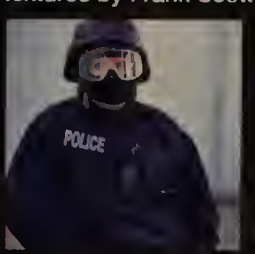

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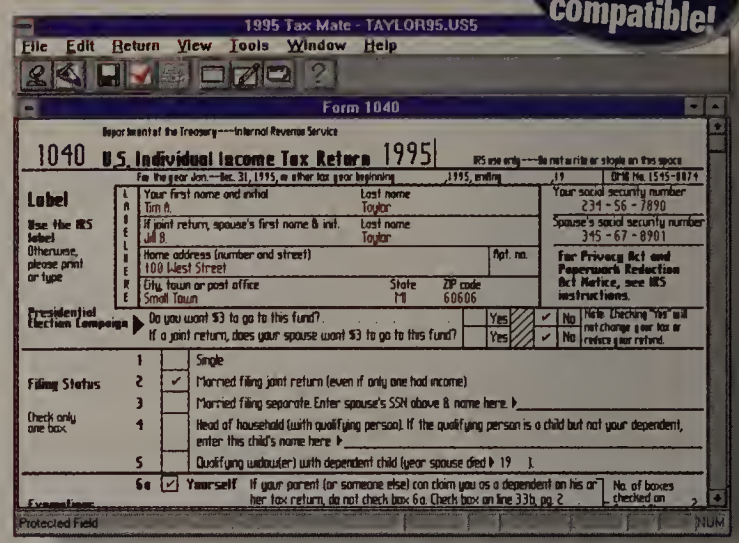

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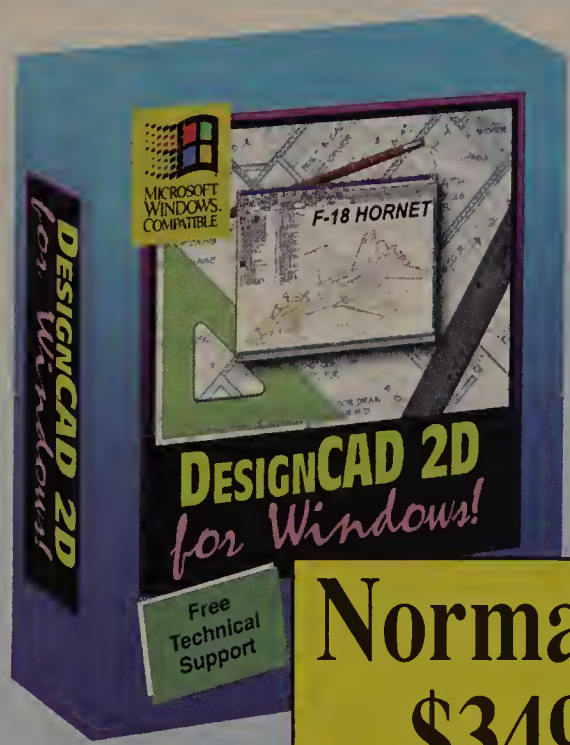

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Internet at Your Fingertips

Direct Net connections: no longer for geeks.

BY LINCOLN SPECTOR

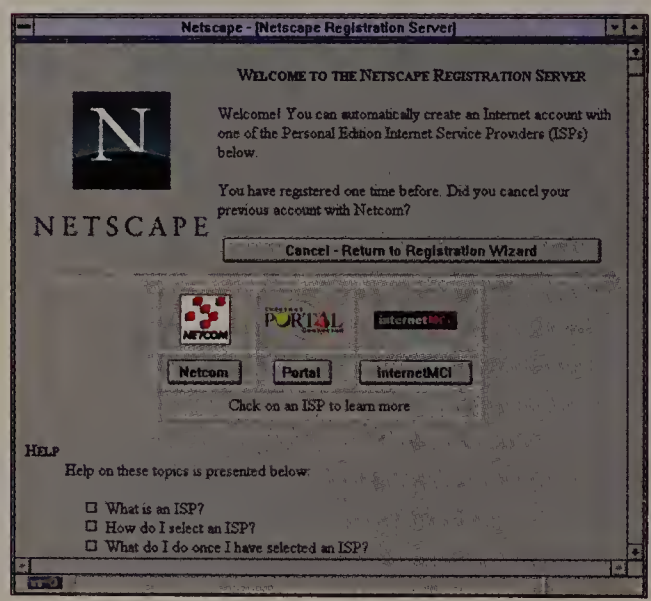
The Internet is wonderful if you don't have to pay for it. But at the $2 to $3 an hour that services like America Online and CompuServe charge, any serious Net surfing is going to cost more than a gourmet chocolate addiction. To support your habit, you may be forced to sell the car, refinance your home, or terminate phone service.

Before you find yourself with a modem and no place to plug it in, consider signing up with an Internet service provider. If you spend more than seven hours a month on the Net, it could return big savings.

Okay, relax—it's not as hard as you've heard. Thanks to some amazing advances in Internet technology (like software designed for human beings), almost anyone can set up a connection. And once you've done that, just about any Internet front-end software will work with it.

The easiest option, especially if you haven't upgraded to Windows 95, is to buy an all-in-one Internet package. These suites combine the basic front-end programs—a browser, a mail reader, and so on—with the back-end software necessary to reach the Net. Most important, their setup programs will present you with a list of ISPs, register you with the one you pick, and configure your system with that ISP in mind.

My favorite such package is Netscape Navigator Personal Edition. It's easy to set up—never asking for anything more complicated than your credit card number. Better yet, it's built around Netscape Navigator, a terrific Web browser that can handle newsgroups, tables, forms, and secure credit card payments; has great bookmark capabilities; and multitasks like a champ. By the time you read this, version 2.0 will offer e-mail capabilities and other goodies. And it's becoming a standard: Many Web pages recommend that you view them with Netscape. (Full disclosure: IDG, *PC World*'s parent company, owns some Netscape stock—but I like the program anyway.)



Netscape's Personal Edition offers you a small choice of Internet service providers.

86'D WITHOUT 95

But what if you want to use an ISP that isn't on Netscape's very limited automated installation list? After all, there are a lot of small, local ISPs out there, many of them terrific. If you're using Windows 95, which comes with the back-end software needed to access the Net, setting up a connection on your own is almost as easy as using Netscape Personal.

Your ISP should supply you with step-by-step instructions for configuring Windows 95's Internet tools. Just follow the directions and don't worry about what they mean. It's like being in the military—you just do what you're told and everything pretty much works—except there's less danger of getting shot.

If the idea still makes you nervous, get a copy of Microsoft's Internet Jumpstart Kit. In addition to a Web browser and an e-mail interface, the kit contains a setup wizard that walks you through the whole configuration process. You'll still need instructions from your ISP, but the whole process will be much less intimidating.

If your computer came with Windows 95, you've already got the Jumpstart Kit. Otherwise, you can buy it as part of Microsoft Plus, a collection of Windows 95 enhancements that really isn't worth its $50 price. Or you can download the Kit from Microsoft's forums on CompuServe, the Web, or The Microsoft Network. The online package is usually referred to as Internet Explorer, but it contains the full kit.

On the Internet, you're never stuck with the software you originally chose. Unlike spouses and operating systems, it's easy to switch Web browsers.

- **Microsoft Internet Explorer** free, **Microsoft Plus** $50; Microsoft; 800/426-9400
  Reader service no. 633
- **Netscape Navigator Personal Edition** $49 street; Netscape Communications Corp.; 415/528-2555, **http://www.netscape.com/**
  Reader service no. 634

Lincoln Spector is a senior associate editor for PC World. *See page 14 for contact information.*

MICHAEL BARTALOS

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New Sight for Sore Eyes

Eyes getting tired? The right glasses can reduce eyestrain.

BY STEVE BASS

Let me go on the record: I'm a cynic, able to sense a scam at 150 MHz. So when PRIO Corporation asked me to try some new eyeglasses intended for computer users, I armed myself with a ten-foot pole. The glasses were supposed to "reduce eyestrain, help you see better, and yadda, yadda, yah." Right. The only thing these glasses could possibly reduce was my bank account.

But in the interest of intrepid journalism (and because here at last was something I could write about that wouldn't honk up Windows), I tried a pair. I went in for a special eye exam, took off my old spectacles, and stuck on a pair of the PRIO glasses.

The difference was like night and day. I've been using the glasses for 30 days now, and I'm stunned at how much better I can see the monitor. Images are sharper than they've ever been, my eyes don't get tired, and, well, it just feels *easier* to settle in on the screen. By the way, PRIO glasses are just as valuable if you wear contact lenses—or don't wear glasses at all. The job they do is independent of, but can be combined with, any conventional prescription.

And I'm not alone. A PRIO representative talked about the glasses at a recent Pasadena IBM Users Group meeting, and several members subsequently tried them and fell in love. Gerald O'Rourke raved: "There's a distinct difference between these and my old glasses—there's less muscle tension. I won't give them up...ever."

And what about eye doctors? Dr. Jonathan Gording, an early PRIO convert, explains why we have trouble staring at a computer monitor: "The problem is that the computer is behaving to the eyes as if it's 8 or 9 inches closer than it really is. If you're 22 inches away, it's like being 13 inches from the screen." He adds, "Stare at that all day and [you've got] eyestrain, blurry vision, and headaches." The PRIO glasses' prescription compensates for this visual discrepancy, bringing the focus of your eyes up to the plane of the monitor. What's more, PRIO glasses are coated to reduce the glare on your monitor from indoor lighting and windows (no, not *Windows;* that's a whole other problem).

AN EYE-OPENER

My own optometrist of 12 years, Dr. Matthew Matsuzaki, has always been something of a doubting Thomas. But PRIO glasses have made him a believer. "The fact is, every patient to whom I've prescribed PRIOs reports that they have better computer vision and decreased eyestrain. Many have been ecstatic," he says.

Yes, there are other companies that make glasses especially for computer users. What makes PRIO unique is its eye examination—using patented, FDA-approved equipment—that determines your prescription. Eschewing the traditional eye chart, PRIO uses a gizmo that simulates a small color computer screen, positioned the same length from your eyes as is your monitor at home. Before the exam, you measure the distance between your eyes and the monitor (PRIO supplies the tape measure) and answer a few questions about a typical computing day.

And if you're like me and wear bifocals, there's an added benefit to PRIO eyeglasses—they're great reading glasses. However, PRIO glasses blur everything more than a few feet away—they're definitely not for driving or archery.

THE PRICE OF VISION

By now you should be worrying about how much these glasses cost. If you've had an eye exam recently, a PRIO test shouldn't cost more than about $80. Figure another $75 to $200 for the glasses themselves, depending on your choice of frames (I picked out cheap, ugly ones because I work from home, my dog doesn't care, and the FedEx driver thinks I'm a geek anyway).

Bottom line: If you spend more than a few minutes in front of the computer each day, invest in a pair of PRIOs. You'll be glad you did—and so will your eyes.

- **PRIO eyeglasses** prices set by individual optometrists; PRIO Corp.; 800/621-1098, 503/636-3707, 503/636-1747 (fax)
  Reader service no. 631

Contributing Editor Steve Bass is a licensed marriage and family therapist and president of the Pasadena IBM Users Group. He can be reached on PC World Online. See page 14 for contact information.

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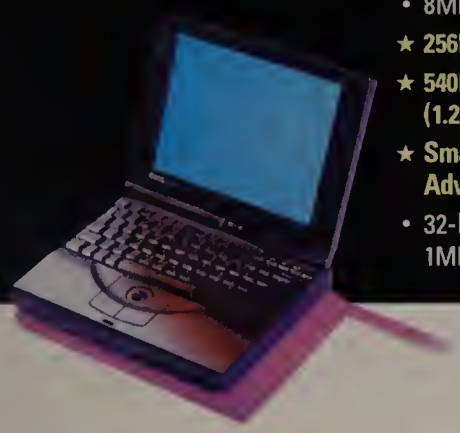

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